MODEL AIRPLANE NEWS

SEPTEMBER 1949 · 25 CENTS

SCRAP BOX

By BILL WINTER

The British Nationals (June 5 and 6) were mainly outstanding for the whopping success of radio control, some 42 entries being made with approximately 25 able to compete on the big day. The winner was Chuck Doughty, a member of last year's Wakefield team who came to America, saw Jim Walker at Akron, and went home to conquer. He used a 6' span *Stentorian*, a kit design with thickened wing, *Mercury-Cossor* equipment, and a *Forster 29* for power. Control was by *Rudevator*. In a high wind that spelled disaster for many models in all events, Doughty cannily launched well up wind and so had his ship under control while others vanished down wind out of control and out of range. Doughty performed a spin and loop to win. Being a newcomer he proved what a lot of us are finding out: radio control can be achieved by anyone who can handle regular free flight.

Both C. S. Rushbrooke, editor of the Aeromodeller, and Bill Dean, who handles the column *"Power Talk"* in Model Aircraft, sound pretty excited about "R.C.'s" brilliant debut. Three makes of sets are available in Great Britain. The newest, ECC *Tele-Commander*, sells for $42. *Mercury-Cossor* claims sales of 500 sets, and ED is thought to be making between 400-500 this year. The total approaches 2000 units. But the single big reason for R.C.'s success in England are the lenient regulations. One British modeler tells us that all you have to do in order to fly radio control is to advise the Post Office of your intention. Over here we still have to take a "ham's" examination in code. Which reminds us; that fellow in the FCC to whom we all have been writing, T. J. Slowie, has resigned as secretary and we now should direct our fire at William P. Massing, the new acting secretary. If you are interested in making radio control practical for all of us, won't you drop Massing a line today, Federal Communications Commission, Washington, D.C.

A few days later Rushbrooke took in another radio control contest, this time at Bretigney, an air field just outside of Paris. Though there were 17 entries, but six turned up to fly, including K. Honnest-Redlick, the only Englishman who, incidentally, flew the sole powered entry. All the others were large span tow line gliders, launched in the usual way and then controlled by transmitters. Despite a good wind Mons. Pepin managed to beat out the power model for first place, landing within 100 yards of the spot, at that.

"These two meetings are, I think," comments editor Rushbrooke, "the thin end of the wedge for what can eventually develop into a fine international contest, and with a little more practice, refining of equipment and application to the task, we can look forward to a contest equaling the Wakefield in appeal."

If only we could muddle through this FCC regulations mess, radio control would hit a tremendous boom in America. Ship design is becoming simpler all the time, models are getting smaller and less expensive, and the R.C. equipment far more reliable. Old-time radio fan, E. L. Rockwood, made some highly interesting remarks on power and model size in a recent issue of West Coast Model News. Rockwood described a successful ship of John Terry's, a glow-plugged *Comet Clipper* (6', remember!) that perks right well with a little *Arden .099!* Weighing 3-1/2 lb., this low-powered ship performs well with single-channel Rockwood equipment and *Rudevator*, and has made over 20 flights of more than 15 minutes duration. Rockwood and some others have been using Joe Weather's *Pacificoaster*, put out as a highly prefab kit by Eagle-Wing Model Company, Portland, Oregon, with preshaped molded shell and crutch construction. Rockwood uses three-channel equipment for left and right rudder and throttle control in his own ship.

Talking of radio, Dick Schumacher, who teamed last year with "Rudevator" Owbridge, at the Nationals, says they are heading for glow plug operation with smaller ships. This one will have an *Ohlsson 19*, with an RK61 receiver and will weigh 2-1/4 lb. Airfoil is an M-6—distinguished by low c.p. travel—with a span of 4'4". Almost down to Wakefield size. Dick says, "I think

(*Turn to page* 6)

BILL WINTER

Bill built first model, an *Ideal Everyboy's Monoplane*, received as a grammar school graduation present, in 1927. Has been building, flying, and writing about aviation ever since. First model article published in 1933, a scale job in M. A. N. Has written articles on model and full size aviation for 20 or so magazines, including such diverse ones as Esquire, Saturday Evening Post, Boys' Life, etc. Author of several books on model aviation, and published Bill Winter's Model Airplane Plan Book. Has been connected with various model plane magazines in editorial capacity since 1937. Favorite model types are: Wakefield, flying scale rubber, free flight gas, in that order, but has flown every type including R. C. In the good old days, he built over 500 flying scales! Learned to fly in 1945 and has over 250 hrs. on numerous light planes. Ran a hobby shop, 1927-1933 in North Jersey. Sandwiched in with all this aviation activity, Bill has collected a family consisting of wife, 7 children, 2 dogs, 2 cats, and now resides with them in the Connecticut hills.

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Serving Aviation 21 Years

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CONTENTS

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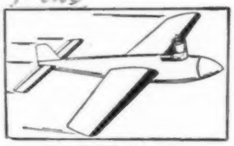

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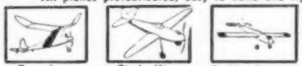

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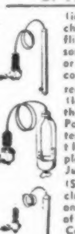

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LATEST WORD on that fabulous bomber, the Convair B-36 *Peacemaker*, is the decision to add sweptback wings in order to step up its top speed to the 500 mph mark! Yes, believe it or not, after adding four General Electric J-47 turbojet engines to the 150-ton monster, the Air Force now is adding swept wings in order to increase its critical Mach number, which now limits it to a top speed of about 400 mph. Actually, the big bomber already has a considerable sweep to the leading edge, and in the new version only the outer panels will be swept back to the required 35° angle. In addition, the Air Force now plans to buy 81 more of the inter-continental bombers.

ONE OF THE strangest-looking "Connies" you'll ever see is now undergoing preliminary Navy flight tests. It is the Lockheed PO-1W Navy patrol plane, which is basically a *Constellation* transport but there the resemblance ends! For towering above and below the mid-fuselage are two of the world's largest radomes, housing special radar "picket" equipment for this high-flying radar station. One of two, the PO-1W is designed to constitute a mid-air radar search station with its Micro-wave Early Warning set mounted atop the fuselage covering a full 360° in azimuth and a full hemisphere in elevation. In its belly, the plane houses a special sea-search unit designed to detect surface or sub-surface Naval craft. In addition, it carries shorter-ranged search gear in the nose and tail and dipole antenna atop the fuselage. Along its aft rear fuselage it carries enemy radar-jamming equipment. The Navy will experiment with the PO-1W as a long-range combat communications and search center for ferreting out enemy aircraft and surface vessels and directing combat planes in their attack—all in periods of restricted visibility.

THE "BRAB," England's bid in the giant plane field, is about ready to fly and may be airborne by the time you read this, for the 100-passenger luxury airliner is finally scheduled for flight tests, after four years of design, construction and tests. The airplane is roughly the size of the huge Convair B-36 bomber (same span, 15' longer and about 15 tons lighter) but is powered by eight engines driving four shafts, each carrying two propellers. The first airplane is powered by eight Bristol *Centaurus* air-cooled engines developing 2500 hp each. The second airplane will be powered by eight gas turbine engines. It is this second version that is scheduled for trans-Atlantic passenger service, the first being slated for experimental and development work only.

THE CIVIL Aeronautics Board has finally removed that "ole debbil," the spin test, from the list of requirements for a private license. One of the most discouraging (at least to the student) maneuvers in the book, the spin and spin-recovery examinations have been part of the license regulations since 1928—and in some of the planes of that era the student had to be an experienced test pilot just to save his neck during the examination! CAB thinking is a little fuzzy but they claim that stall-recovery is a much better requirement of the student than spin recovery. This, of course, makes good sense insofar as you have to stall before you can spin, but where one leaves off and the other begins is a pretty narrow line. At any rate, we won't have to worry about "pull out within 2-1/2 turns" any more!

SECRETARY OF National Defense Louis Johnson has suddenly reversed his field and has embraced not only Naval Aviation but Marine Corps Aviation as well as an essential to our nation's security! After stating to a group of newspapermen that he planned absorption of these two components into the Air Force, Johnson has done a right-about-face and urged public support through Congressional appropriation for these two services. Washington observers were flabbergasted at this sudden reversal of policy, after Johnson had bullishly smashed his way towards eventual atrophy of our sea-going aviators. Johnson has approved the expenditure of $80,000,000 for strengthening of the flight decks of three carriers to handle the increased weight of the Lockheed P2V *Neptune* and North American AJ twin-engine patrol and attack bombers. Heaviest load the wartime carriers had to take was the eight tons of the Grumman TBF *Avenger* but the new bombers will weigh 25 tons and more. (The North American B-25 bombers of Doolittle's famed Tokyo raiders only took off from the U.S.S. *Hornet*—they did not land aboard and it is the landing load that determines the deck strength required.)

(*Turn to page 52*)

Scrap Box

(*Continued from page* 1)

a small ship has just as good a maneuvering area due to smaller turns and it stays in the transmitter area better; small ships take the beating and will stay in small areas." Unquote!

Dick is a many-irons-in-the-fire modeler. Among his recent concoctions is a new Wakefield ("I got my notice of what has been going on three days after the local elimination run-off.") that weighs 8-1/2 oz., with *Elmic* timer and 4 oz. of rubber. With 14 strands of *Dunlop* the motor run is 1:20. Castor oil is best lubricant he finds. Also has a 150 sq. in. free flight for the *Baby Spitfire* with two *Elmic* timers, one for air-bleed cut-off a la British Diesels and the other for a pop-up tail dethermalizer. Favorite Schumacher gripe: Plymouth restriction on over 25 year olds was, in his opinion, a case of AMA selling down the river the older fellows who put time and money into the Academy; that need for protection of younger fellows is so much hogwash, since a look at the record shows they need darn little protection. Seems to us if youth must be served, the age limit might be 18. Why make it 25 years; that just keeps the grand-paps from beating the fathers! (Don't be too unkind, men, when you tell us off!)

But it is fact that the average club falls down badly on its duty to the beginner and runs affairs merely for its own amusement. What is the matter with this? To quote from June Pierce, "It is getting harder all the time to induce the older modelers to help the youngster get started. Look at any of our contests and see how few Juniors we have, and how many Senior and Open contestants. A good many business men would like to give a lot of their time helping put on a contest for Juniors, but when it comes to the second or third year contest and they see they are putting on a meet mostly for grown men, well, they are all through and 'let the old men entertain themselves.' We had four annual Kiwanis-sponsored contests and, after the second year, it got mighty hard to get the men away from their families to put on a contest for a big group of older men from other cities and for perhaps 25 local boys." That, brethren, we submit as the prime evil of modeling in America. However, the cure is not killing off the Open-class boys but getting in the Juniors.

Tried Mel Anderson's *Baby Spitfire* in a free flight designed to FAI rules. You add wing area to horizontal tail area and divide by 80 to get required cross section; wing loading is 3.9 oz. a square foot. By making a straight line graph of minimum areas for *Infant's* up to .60's, we arrived at 138 sq. in. for the *Baby Spitfire* pylon, our first pylon job by the way. First test flight did 1:34 on 21 sec. The N.A.C.A. 4612 airfoil already tried on Wakefields proved out here, too. Really a nice airfoil. The biggest impression pylon made on us was extreme ease of adjustment and an in-the-groove flight path that made each flight precisely like the one before. Only adjustment was rudder for turn. also using O.K.'s little *Cub*, which is a ball of fire.

A. J. Jager writes some words of wisdom about tailless or flying wing gliders in the June, MODEL AIRCRAFT. A typical ship described had a 70" wing, a 8.2" root chord, 6" tip chord, Clark Y at the center and 10% symmetrical tips, with 30° sweepback and 8° washout of the tips. Area was 500 sq. in. and weight 12.69 oz. Quite popular in Holland, these wings even perform successfully without the use of dihedral. Rather small fins are located at about the two-third span point.

The same issue contained plans for a super-lightweight rubber job—a type of model popular in Great Britain—with a most unique dethermalizer. The wing, which has a connecting cord between the left side dihedral break and the rear tip of the fuse, comes off. Then the ship comes

(*Turn to page* 34)

REPORT FROM THE WEST

by Lew Mahieu

The West Coast has been buzzing with activity and contests. This month we will report on some of the larger contests and give you a brief story on our selection for the modeler of the month—Andy Petersen.

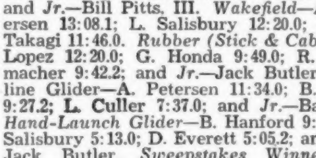
The *San Diego Aeroneers* held their Annual Free Flight Gas Contest May 15. Even though there was a slight drizzle during the day, the meet went on as scheduled. One hundred and twenty-five contestants saw the *Sun Valeers* walk off with the Perpetual Club Trophy. The first three place winners in the following events were: *Class A*—D. C. West 17:11.0; Bob Hanford 12:26; and Tom Stevens 12:07. *Class B*—Alf Faulkner 14:29; J. R. Bicknell 13:08; and Bruce Strehlow 12:43. *Class C*—Larry Boyer 15:44; Frank Davis 12:47; and Lud Kading 12:35. *Class D*—R. C. Weihe 21:58; W. L. Short 17:05; and F. L. Swaney 14:42. *Junior Awards*—Bob Turner 14:33; Bruce Strehlow 12:43; and Less Bartlett 11:26. *Sweepstakes Winner*—Larry Boyer.

The Western All Free Flight Contest at Artesia, Calif., was a huge success. There were over 450 entries in the two-day affair on June 4 and 5. Approximately $3000 in trophies and prizes were handed out to the following winners. *AA Gas*—D. C. West 8:50.8; B. Hanford 8:30.8; J. Jordan 7:51.9; and *Jr.*—Kusick. *A. Gas*—R. Rigney 15:48.8; D. Everett 15:00.2; C. Launderville 13:11; and *Jr.*—Moffitt. *B Gas*—R. C. White 17:10.8; Thompson 15:47.8; A. E. Hunt 10:44.6; and *Jr.*—Tom Moffitt. *C Gas*—J. Meckoll 12:00.0; L. Boyer 11:17.0; G. Shaulis 7:01.0; and *Jr.*—Jack Butler. *D Gas*—W. L. Short 17:48.0; L. O. Corbly 14:34.7; R. Buchannan 12:10.0; and *Jr.*—Bill Pitts, III. *Wakefield*—A. Petersen 13:08.1; L. Salisbury 12:20.0; and F. Takagi 11:46.0. *Rubber (Stick & Cabin)*—B. Lopez 12:20.0; G. Honda 9:49.0; R. Schumacher 9:42.2; and *Jr.*—Jack Butler. Towline Glider—A. Petersen 11:34.0; B. Lopez 9:27.2; L. Culler 7:37.0; and *Jr.*—Bateman. *Hand-Launch Glider*—B. Hanford 9:58.5; L. Salisbury 5:13.0; D. Everett 5:05.2; and *Jr.*—Jack Butler. *Sweepstakes Winner*—Bob Hanford. *Junior Sweepstakes*—Jack Butler.

Compliments are in order for Ray Acord, Contest Director, Bill Cranford, of Cranford's Airport, Artesia, and the merchants and dealers of Artesia for making such a fine contest possible.

The F.A.S.T. Club is doing a wonderful job with team racing. You can't imagine what a thrill these team races are until you have actually witnessed one. The results of Team Racing Meet No. 4, held at Santa Anita May 29, are: *First*—H. M. Bourgeois 70 pts.; *Second*—E. S. Hartranft 58 pts.; and *Third*—Rudy Panko 24 pts. *Beauty Event*—Larry Johnson. Here are the total accumulated points for the F.A.S.T. Club's first four meets: E. S. Hartranft 170; Larry Johnson 122; Rudy Panko 98; H. M. Bourgeois 70; Ormand S. Sutter 70; Phil Randolph 30; Don Rouse 30; Steve Crowe 24; O. K. Foster 21; Roy Pooler, E. S. Westlake, Phil Gallagher, and Roy Fixler 7.

Thanks to Carl Stokes for sending us the names of the winners of the North West Model Air Show, held in Seattle, also on May 29. The boys who won trips to the



Ralph Loveland refuels his *INFANT* job at San Diego Aeromers meet.

Andy Petersen with winning towliner

1949 Nationals at Olathe, Kansas, were: Charles Hollinger, Jerry Stebbins, Martin Eriksen, Gerald Thomas, Norman Baronsky, and Ted Enticknap. They had a very fine meet which was the largest held in that area for some time.

The *Nevada Aveites* have announced their Annual Western States U-Control Contest. The meet is to be sanctioned by AMA and will be held October 15 and 16. *Remember*, there will be big beautiful trophies, prizes and free accommodations, and a Bar-B-Q for all contestants. Don't Miss It! For further information, write to Ralph Wilson, 520 North Eleventh Street, Las Vegas, Nevada.

* * *

We have selected Andy Petersen as modeler of the month because of his outstanding record not only as a consistent winner but for his work with clubs, and his activities in behalf of other model builders. Andy is really helpful to his many friends. He is 34 years old and an employee of Lockheed Aircraft. Andy says: "For me, model airplanes have become a way of life. I've been in the game so long that I now admit I can't chase a model airplane anymore without puffing like a steam engine. I started in 1934, organizing *Los Angeles Junior Birdmen*, Squadron 92, which grew to over a hundred members. In 1936 I was fortunate enough to win the Junior Birdmen Indoor Championship and a trip to San Antonio, Texas, where the Finals were held.

"Since modeling seemed to provide a means of travel, I was rewarded with a trip to the 1939 Nationals in Detroit by winning the Gas Model Airplane Association of Southern California Eliminations that year. The war soon prevented further attention to the hobby.

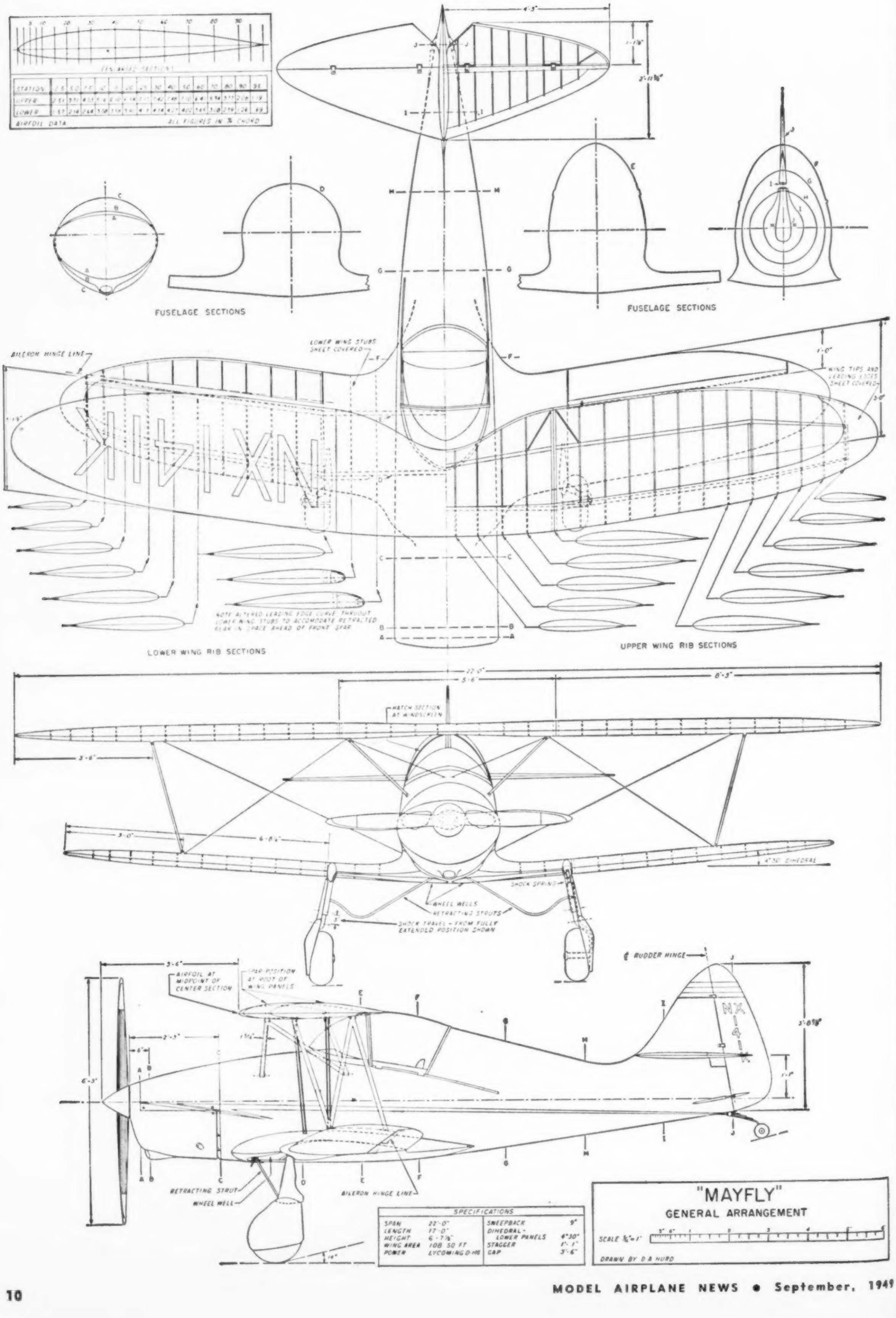
"After the war, my wife urged me to resume model building, much to her eventual regret, I'm afraid. I had acquired a roomy den in which to work, and before long my garage was full of new balsa contraptions.

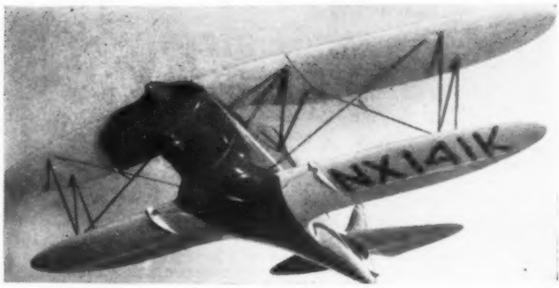
"About this time, some of the old boys from the *Junior Birdmen*, Squadron 92, Bill Lopez, Al Lowy, Yuji Hirose, Hans Wall, Paul Jones, Chuck Cutter (to name a few) decided we needed another club, and so the *Thermal Thumbers* was born. My enthusiasm soon landed me in the office of president.

"In 1947 I placed second in Sweepstakes to Frank Cummings in the All Western Open Meet. I consider Frank to be one of the greatest model builders of all time. We formed the *Thermal Thumbers* team for representation at the 1947 Nationals and won the Megow Trophy at Minneapolis.

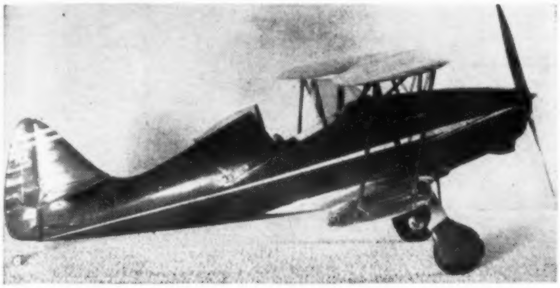
"The *Thermal Thumbers*, being a 'contest-happy' club, conducted a Wakefield Team Competition on May 22 of this year, and I was quite pleased to find myself on the winning team. I used my two-year-old wakefield job which I have flown in eleven meets to date. This ship has placed in the top three in nine of the eleven meets entered. Two weeks later I won what was understood to be the Wakefield Eliminations, at Artesia, Calif., with the same crate. I also won first in Towline at Artesia to gain the second place Sweepstakes Award.

"At the present I am involved as one of the contest directors for the Southern California Plymouth Eliminations, prompting me to wonder whether this isn't the answer to what happens to a model builder who can no longer run the mile in ten minutes flat."


AIRFOIL DATA
ALL FIGURES IN % CHORD
FUSELAGE SECTIONS
FUSELAGE SECTIONS
AILERON HINGE LINE
LOWER WING STUBS SHEET COVERED
WING TIPS AND LEADING EDGES SHEET COVERED
NX14IK
NOTE ALTERED LEADING EDGE CURVE THRUOUT LOWER WING STUBS TO ACCOMODATE RETRACTED GEAR IN SPACE AHEAD OF FRONT SPAR
LOWER WING RIB SECTIONS
UPPER WING RIB SECTIONS
HATCH SECTION AT WINDSCREEN
SHOCK SPRING
WHEEL WELLS
RETRACTING STRUTS
SHOCK TRAVEL - FROM FULLY EXTENDED POSITION SHOWN
RUDDER HINGE
AIRFOIL AT MIDPOINT OF CENTER SECTION
SPAR POSITION AT ROOT OF WING PANELS
NX 14 IK
RETRACTING STRUT
WHEEL WELL
AILERON HINGE LINE
SPECIFICATIONS
SPAN 22'-0"
LENGTH 17'-0"
HEIGHT 6'-7¼"
WING AREA 108 SQ FT
POWER LYCOMING O-145
SWEEPBACK 9°
DIHEDRAL - LOWER PANELS 4°30'
STAGGER 1'-1"
GAP 3'-6"
"MAYFLY"
GENERAL ARRANGEMENT
SCALE ⅛"=1'
DRAWN BY D A HURD



Here is a project for the real craftsman; though not designed as a flying model, Mayfly is a fine prototype for many model aviation purposes



Mayfly

by FREDERIC K. HOWARD

IN the April, 1949 MODEL AIRPLANE NEWS several pictures of a small "exhibition scale model" biplane were published. A number of readers became interested in the model's design and questions were received ranging from the suitability of the design for controline flying to the feasibility of building the full size airplane. The plans and details of this model—named the *Mayfly* for reasons that shortly will become clear—are offered here, but before considering these, a brief explanation of the design and type of model represented by the *Mayfly* may be of interest.

It is a detailed scale model of a non-existent airplane of original design—a model type outside of the conventional scale classification. Although no scale contests will be won by original designs, models of proposed but nonexistent airplanes are by no means out of the ordinary. The aircraft industry has for many years utilized wind tunnel models, "mockups," and engineering scale models of various sorts to insure that the arrangements and ideas featured in a new design are practical and desirable before the design is put into production. The *Mayfly* is an example of the amateur's equivalent to the industry's engineering scale model. The intention in this instance was to incorporate in the model ideas for a modern version of a single-place sport biplane—one of the most elementary designs for the amateur.

Original detailed models have one definite advantage over other scale models: the builder has an opportunity to work with his own ideas instead of simply copying in miniature those of others. It isn't necessary that he be an aeronautical engineer, but a certain familiarity with the design and construction of airplane types similar to that planned *is* required. Since realism depends on exact and uniform proportioning, the design must be derived in terms of the actual airplane and the model then built accurately to scale to this design.

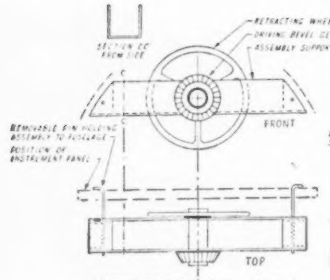
Neither single place aircraft nor biplanes are currently much in evidence, chiefly for economic reasons. In the recent past, however, the *Payne, Rose,* and *Wiley Post* were fairly well-known single place biplanes while the *Heath, Aeronca,* and *Buhl Pup* were single place monoplanes marketed with varying degrees of success. More recently, the *Piper Skycycle* and *Luscombe 10* were attempts to revive interest in single place machines. Of these examples, the *Mayfly* bears the closest resemblance to the *Rose* in areas, dimensions, and proportions.

There are a few basic design considerations in the *Mayfly* worth mentioning since they explain the general appearance of the model and typify the problems modelers will run into when attempting to incorporate their own ideas in scale models. For example, the retractable gear dictated two requirements: first, that a lower center section be built integral with the fuselage; and second, that the wing panels be rigged with sweepback. The first requirement followed from the necessity of suspending the landing gear at points outside of the basic fuselage structure to insure an adequate wheel tread. The second was adopted to place the gear a suitable distance ahead of the center of gravity. In the conventional biplane, the landing gear is located a considerable distance ahead of the lower wings; and if it is desired to have the gear retract into the juncture of lower wing leading edge and fuselage (the logical position for the retracted gear in biplane designs), it is necessary to move this juncture further ahead without altering the position of the entire wing assembly with respect to the center of gravity. In the *Beech* biplane this is accomplished by negative stagger; in the design discussed here a moderate amount of positive stagger plus 9° of sweepback accomplishes the same result.

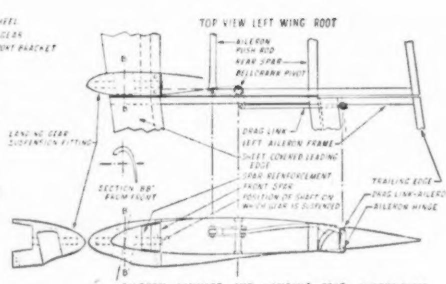
The shape of the *Mayfly's* fuselage was determined chiefly by the amount and location of the space needed to accommodate the *Lycoming* O-145, 75 hp engine, and the cockpit shape necessary for the average sized person. These two considerations determined, for example, that the fuselage should vary from a section wider than its depth in the extreme nose to a section deeper than its width just aft of the cockpit. The shape of the fuselage behind the cockpit was designed to permit the sliding hatch to remain flush with the surface in all positions. The slope of the fuselage forward from the cockpit was drawn to insure as adequate forward visibility as possible. These examples indicate the extent to which basic considerations will influence appearance.

The accompanying plans are similar to the usual detailed scale drawings with the exception that the details shown relate solely to the model. These details are intended to represent the scale model equivalent of definite structural features that

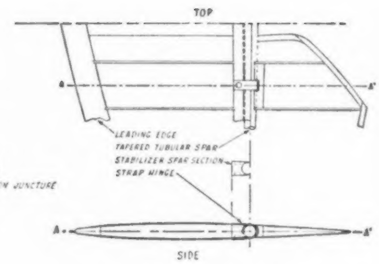
(Turn to page 42)



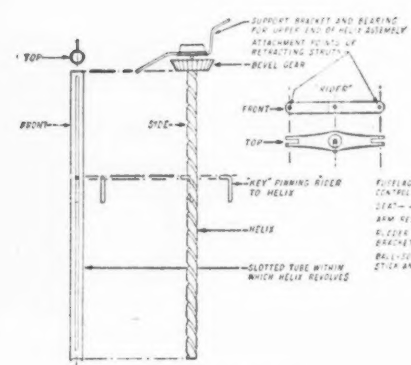
LANDING GEAR ACTUATING ASSEMBLY



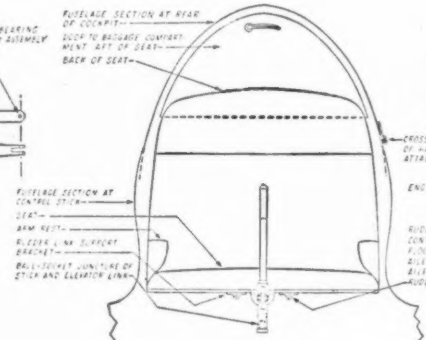
AILERON LINKAGE AND LANDING GEAR SUSPENSION



EMPENNAGE "STRAP" HINGE ARRANGEMENT

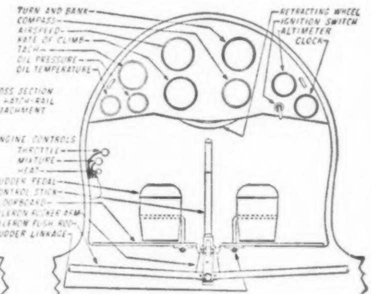


LANDING GEAR RETRACTING TUBE ASSEMBLY



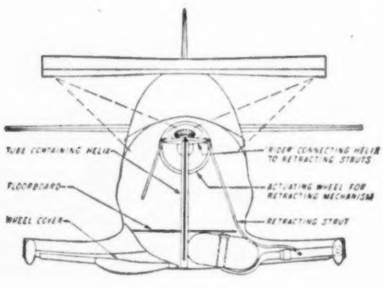
COCKPIT INTERIOR LOOKING AFT FROM CONTROL STICK

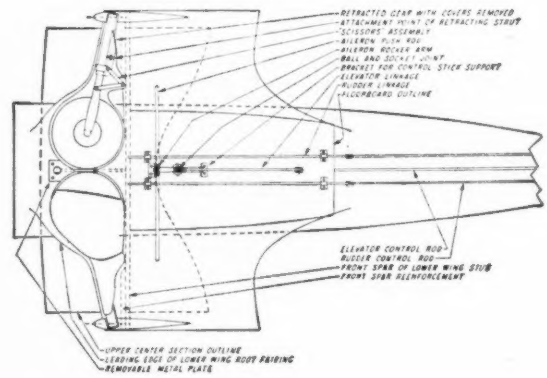
COCKPIT INTERIOR LOOKING FORWARD

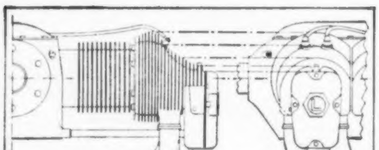


ENLARGED DETAILS

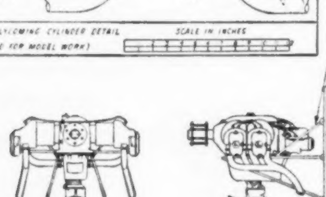
SCALE 5/8" = 1'



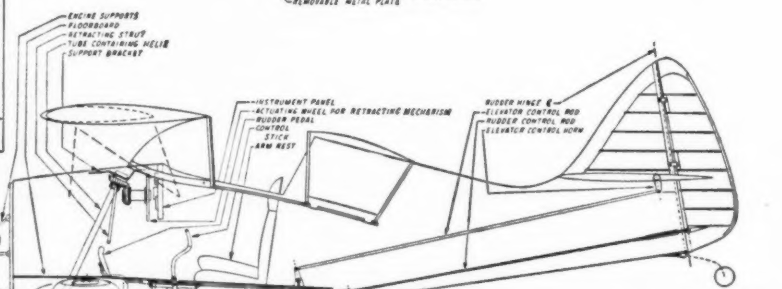




ENLARGED LYCOMING CYLINDER DETAIL
(SIMPLIFIED FOR MODEL WORK)



LYCOMING O-145 75 HP



"MAYFLY"

CONSTRUCTION DETAILS

SCALE 3/4" = 1'

design forum

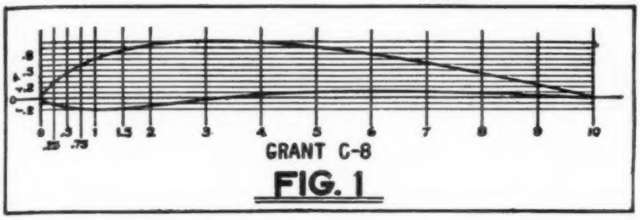


FIG. 1

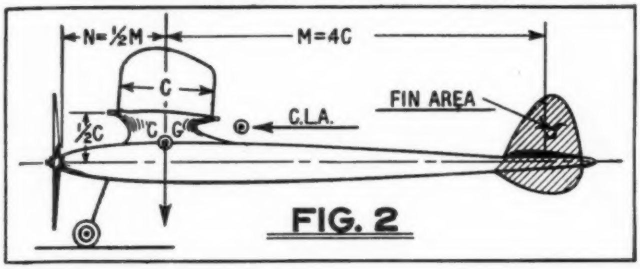


FIG. 2

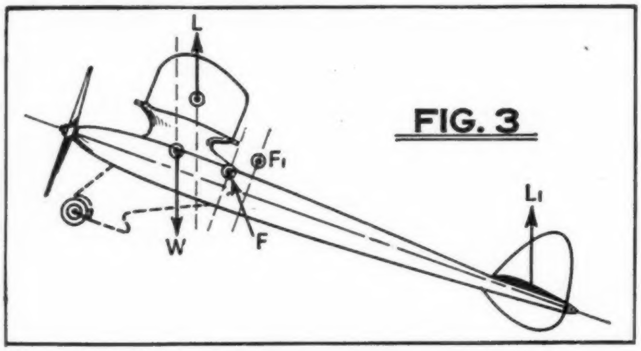


FIG. 3

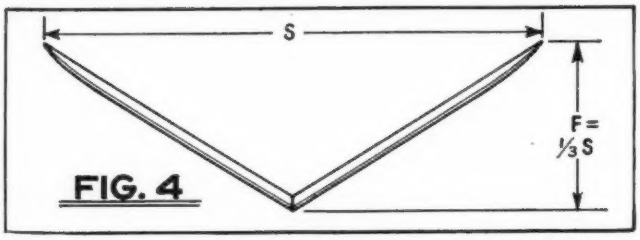


FIG. 4

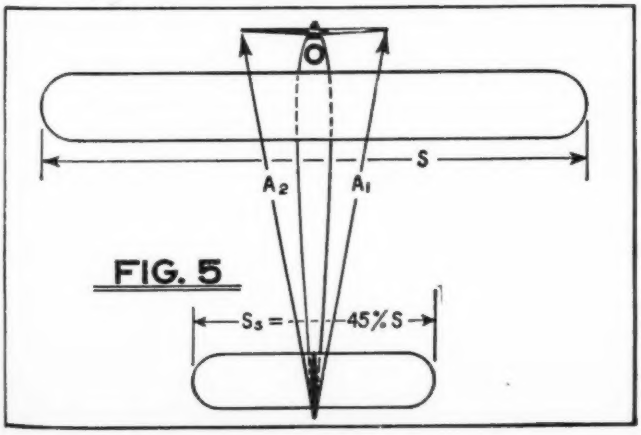


FIG. 5

by CHARLES H. GRANT

MANY individual features of design have been discussed in past *"Design Forum"* articles which readers have found helpful. However, some who have completely understood individual features, have found difficulty in putting these separate parts together in practical form. It is the characteristic of an airplane that when a change in design is made in one feature other related features must also be modified to obtain the expected result of the single feature change. For instance, if the dihedral is increased to give greater lateral stability, it is also often necessary to increase the size of the fin. To make clear the useful application of the individual design features let us outline the general procedure of design, showing how these features are put together for greatest efficiency and stability.

Conrad Ellermeyer, of DuBois, Ill., is one who is interested in knowing about the application of lifting elevators. He wishes to build a super stable model in which he can later place radio control apparatus. Keith Gardner, of Pauley Street, Oakland, Calif., is interested on the other hand in a Wakefield design. Other readers have requested information on still different types of planes. Strangely enough, a properly set up airplane can form the basis for either a gas model, a Wakefield model, or any desired type. The difference between the types lies only in the structural design and minor changes in the proportions required for the different forms of power used. As we establish our design here we will indicate the particular modification required for either rubber or gas power.

When starting, first consider the wing. This element affects performance more than any other part except the propeller. When carefully designed, not only the drag will be low and the lift high, but with correct dihedral the wing will contribute to stability. First, establish the plan form of your wing; then, determine the span and the chord lengths at various points along the span. Theoretically, an elliptically shaped wing is most efficient. However, there has been some question as to the amount of added efficiency of this type at the slow flying speed of models. On many occasions planes with constant chord wings have flown just as well as planes with elliptical wings. An excellent procedure is to use a constant chord over approximately 3/4 of the span and then add elliptic wing tips. This form of wing is both efficient and simple to build.

Of course, the object is to climb rapidly and glide slowly. If a very high lift airfoil is used, with extreme under-camber, the rate of climb is slow. If the camber or height of the upper surface curve is approximately 1/10 the wing chord and the under surface is concave, a combination of fast climb and slow glide with low sinking velocity usually results. Select an airfoil that will fulfill these requirements. The widely used Clark Y airfoil is an efficient section but it is too fast, with too little lift for duration airplanes. We suggest a wing section similar to the one shown in Fig. 1, the Grant C-8. You will find it one of the most efficient sections you have used. It has already won many major contests. When first developed and used in 1930, it walked away with the New England championship on a twin tractor and repeated this performance in 1931 on a twin pusher. It is excellent not only for gas models but for Wakefield models as well.

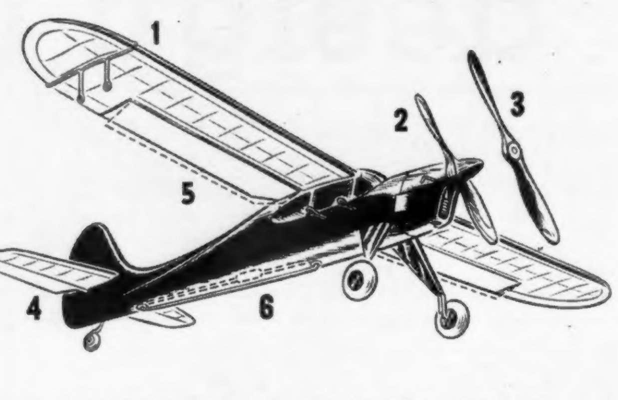
The next step is to consider the most important factor in model flight, namely, stability. For proper LATERAL stability the main wing dihedral may be figured at 1" per foot of span (wing tip rise). That is, if the wing span is 48", each wing tip should be raised 4" *above the top point of center wing chord*. This is sufficient for either simple dihedral or polyhedral wings and will provide quick lateral recovery when other design factors have proper value and arrangement. The effect of dihedral may be increased by placing the wing fairly high above the C.G. or center of weight of the airplane. Of course, the center of gravity cannot be determined accurately before the airplane is laid out and built. However, it will usually assume a low position if the thrust line is below the wing a distance equal to 1/2 the wing chord

(*Turn to page 38*)

off the beaten track

by BILL WINTER

FIG. I COMBINED FREE-FLIGHT & CONTROL-LINE MODEL



1. REMOVABLE WING GUIDE 2. CONTROL-LINE PROP 3. FREE-FLIGHT PROP 4. ELEVATORS TAPED IN NEUTRAL FOR FREE-FLIGHT 5. ADJUSTABLE FLAPS FOR FREE-FLIGHT TRIM 6. SLIDING WEIGHT TO ADJUST C.G.

Illustrated by H. A. Thomas

A GREAT failing of present-day modeling is our single track approach to the kinds of ships we make. Time was when a good builder would try most anything, but the modern hobbyist often is just a fan attracted to, say, controline until his ardor cools. That's a shame, for model airplanes really offer an almost unlimited number of things to do and try. Things that are fun, that challenge ingenuity and flying skill.

We can thank the dissatisfaction of old-timers who tired of a rut for innovations like team racing, proto jobs and Goodyear-type models; for precision contests that permit little free flight planes to compete on equal footing with monsters, and for realistic ships to contend with the ungainly contest model. What else might we discover if we but look?

Take this team racing deal. It suggests variations that can be tried wherever two or more modelers get together. How fast can you make a scale racer go? Would you back a *Pete*, a *Folkerts*, or a *Caudron?* Refueling is part of the picture; what would happen if a ship was permitted only so much fuel but was disqualified for running out of gas before the end of the race? Here is an element that would equalize competition, emphasize cleanness and finish of design, attention to weight, and care in operation and handling of engine and airplane. It hints at endurance. So why not a controline endurance contest on measured fuel. Being on wires, such a ship certainly couldn't fly out of sight!

Perhaps such an airplane would not look like a speed model. Maybe its wing would be bigger, or thicker. How big, and how thicker? Ingenuity in combining lightness and strength, in developing props, fuel economy, airfoils, perhaps retractable landing gears, would pay off. What kind of an airplane do you think would result? You can bet your boots it would give the Sunday afternoon crowd something to watch besides monotonous wingovers and loops. Impromptu contests would spring up on all sides as builders vied for duration. And it wouldn't be too easy; overly light machines would come in on the lines and all the rest of it!

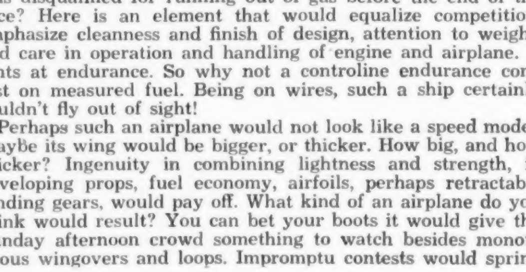
Then there is free flight, good old, poor old, free flight. Look what the *Infant* started here. Why, a fellow can take a tiny inexpensive kit of a scale model and make it fly like the dickens. So why not a scale endurance event for *Infants*, perhaps based on various lines of kits. One yearly Eastern event for rubber specifies *Guillow* kits.

Wouldn't it be possible to design a combined free flight controline ship? With these small airplanes, a builder could clock his job for speed, then unhook the wires for a duration flight. Though not too practical for the larger engines, the new baby engines of various makes permit a more flexible machine than one that cannot fly without wires. New compromises in design between the two should add some interesting airplanes to our experience. To say the least it would do wonders for characters who hate controline or, on the other hand, hate free flight.

The fact that numerous "goats," or standard free flight models of all sizes, have been flown on short lines in controline, proves the feasibility of the idea. The sketch suggests a few possibilities for improving performance by compensating for difference in trim between the ideal free flight and the U-control ship. All these things can be simplified. The tail could be hinged at the leading edge with small movement to eliminate elevators; a convenient weight could be hooked onto the nose or dropped into a built-in box for U-control trim. Even wing incidence could be changed in trim by raising the trailing edge for U-control, and the leading edge for free flight. Normal wing position would be midway between the two to permit easy change in either direction.

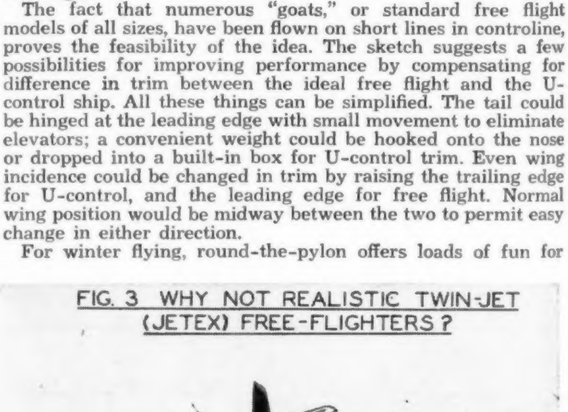
For winter flying, round-the-pylon offers loads of fun for

FIG. 2 ROUND-THE-PYLON SHIPS COULD BE TRUE-SCALE



NOTE HOW EXTRA TENSION ON UPPER LINE WOULD RAISE ELEVATORS WHEN PLANE IS LOW. CONVERSELY IT WOULD PREVENT EXCESS CLIMB.

FIG. 3 WHY NOT REALISTIC TWIN-JET (JETEX) FREE-FLIGHTERS?



INBOARD JET LOCATIONS ALLOW SAFE FLIGHT WITH EITHER OR BOTH JETS OPERATING.

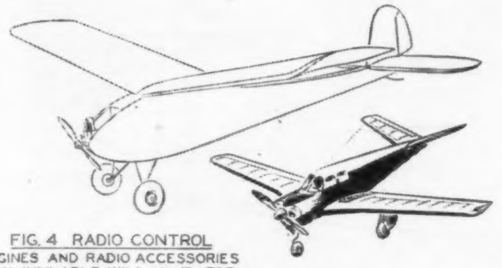
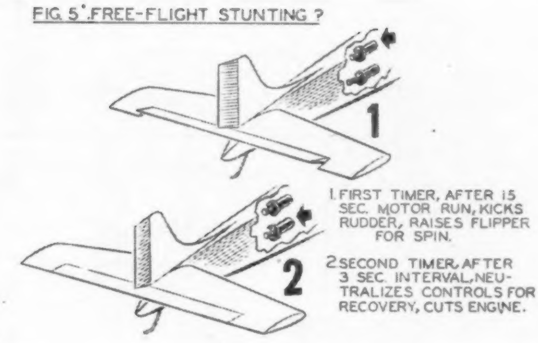


FIG. 4 RADIO CONTROL
ENGINES AND RADIO ACCESSORIES NOW AVAILABLE WILL MAKE FOR SMALLER, MORE REALISTIC MODELS, FOR EXPERIENCED "RC" MEN.

FIG. 5 FREE-FLIGHT STUNTING ?



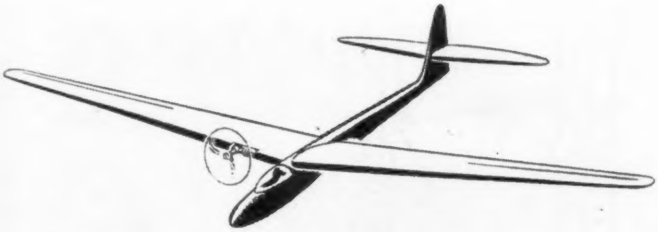


FIG. 6 A TRUE POWERED GLIDER
ASYMMETRICAL MOUNTING OF MIDGET ENGINE WOULD MAKE GENTLE POWER TURNS IN 6-7 FT SHIP

FIG. 7 HIGH SPEED GLIDER
SPEED 75-100 M.P.H. MADE OF HARDWOOD AND PLYWOOD FOR POWERFUL CATAPULT LAUNCHING.

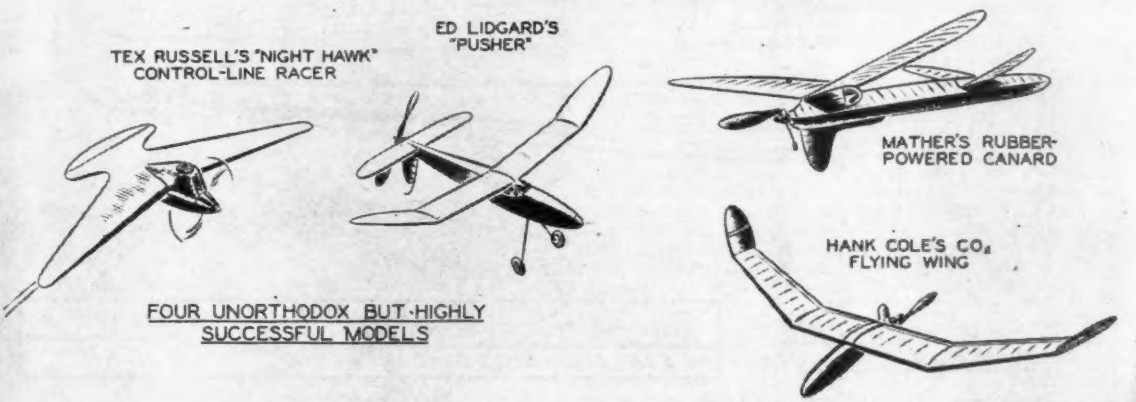
club-interest events that might possibly be run after meetings. Such events for two sizes of ships and lines became very popular in England. The design that proved best was a hybrid indoor-outdoor fuselage model with heavy microfilm covering to hold down skin friction. An entirely new wrinkle for this side of the water, round-the-pylon would teach new tricks in prop and motor combination. And why not use CO-2 and baby gas engines as well as rubber? Best dimensions and layouts, airfoil selection, weight, and so on, would have to be learned. Many would be the arguments for streamlining versus lots of lift. Design need not be limited to originals, for flying scale would add an element of plane selection. Would an *SE-5* beat a *Stinson?* Such an event for clubs would have the great advantage of providing something interesting for both blase veterans and enthusiastic youngsters.

The English have evolved rules as to line length and pole height for both sizes of airplanes. A single line attaches to a wing tip. If double lines were used for powered models, the lines could hook up with a bellcrank as on any U-control model; then, as the ship climbs or descends, the varying tension on the two lines would cause the flippers to control the flight. Proper control movement would have to be learned to avoid over-controlling. While the perfectly balanced model would drone around the circle steady as a rock, automatic control might be modified to provide limited maneuvers, better take-offs, flared-out landings, and perhaps a kind of wingover.

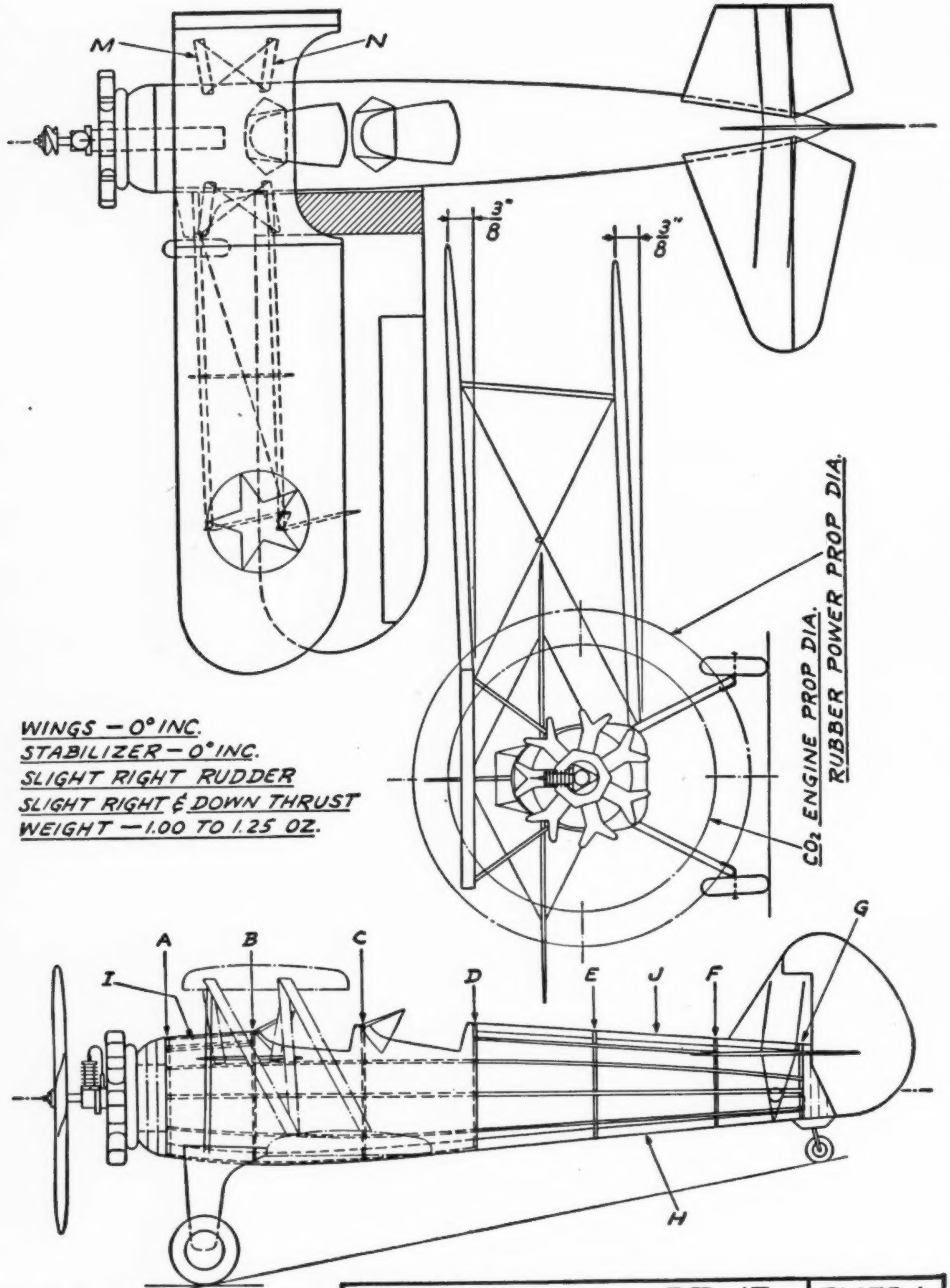
For the builder who works alone and wants new things to do, there is *Jetex* power. When prop-driven fighters faded out in favor of the jets, many were the laments that you couldn't build jet flying scale and who wanted to bother with a prop anyway. So here is jet and many of us don't give it a tumble. It is fun too, for we tried it. *Jetex* units now come in four sizes and the larger ones permit a substantial airplane. Personally, we are fascinated by the idea of a twin-jet *Banshee* or *Airacomet* with two *Jetex* units side by side in the wing roots. This design would enable easy installation and operation. The fact that most of the effort would go into the building means that high cost of fuel would not be very much of a handicap. Such a machcine would not be flown with the frequency of a free flight model.

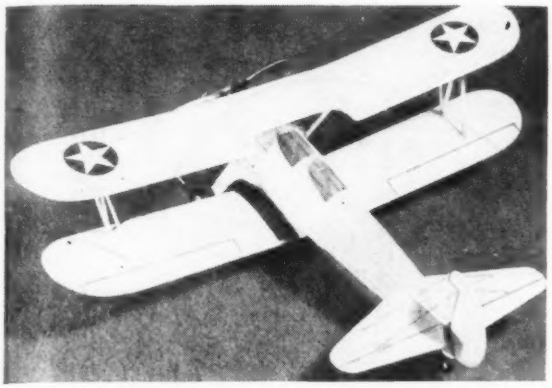
For scale or semi-scale, composite power plants open up a world of interesting possibilities. Take the Ryan *Fireball* type. If an O.K. CO_2 with prop was installed in the nose and the *Jetex* in the tail, you could light the fuse, flip the prop, and turn her loose. The engine should be set for a short powerful burst to grab altitude. The *Jetex* will take a few seconds to put its shoulder to the wheel and, when the prop stops, the

(Continued on page 46)

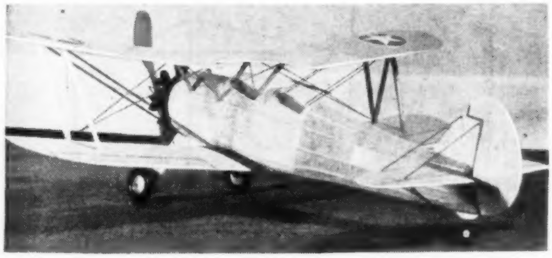


FOUR UNORTHODOX BUT HIGHLY SUCCESSFUL MODELS

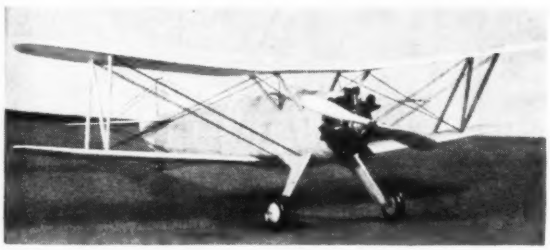

M
N
3/8"
3/8"
CO2 ENGINE PROP DIA.
RUBBER POWER PROP DIA.
WINGS — 0° INC.
STABILIZER — 0° INC.
SLIGHT RIGHT RUDDER
SLIGHT RIGHT & DOWN THRUST
WEIGHT — 1.00 TO 1.25 OZ.
A
B
C
D
E
J
F
G
I
H
NOTE:- 3 VIEW ON THIS PLATE IS HALF SIZE.
BOEING — STEARMAN PT-17
SCALE OF MODEL 1/2" = 1'-0"
PLATE 1
CAK



PT-17



Kaydet



BY C. A. KUKUVICH

PRESENTED here is a 1/2" = 1' flying scale model of the PT-17 *Kaydet* Primary Trainer. During World War II there were thousands of these PT-17 trainers built to train our air cadets to fly. Today the PT-17 is to be found on just about every airport in the U.S.A. and is used for everything from stunting to seeding farmland.

Nothing much need be said about building the model, except that if the following instructions are read and the drawings studied, no difficulties should be encountered. It might be noted here that the finished flying scale model can be powered by either rubber, or the *Campus A-100* CO_2 engine.

FUSELAGE. The first thing to do is cut out the formers, after tracing them on to the proper thickness of balsa. Formers A and G are cut from 1/16" thick sheet balsa, and formers B, C, D, E, and F are of 1/32" thick sheet balsa. Use a medium weight straight grain wood for these pieces, and make sure that the grain runs the length of the formers. Then from the 1/16" thick sheet cut out the base stringers H, I and J so that the grain follows the length of the stringers. Assemble the formers to the base stringers and cement in place making certain everything is in line. Set the 1/32" x 1/16" stringers in place and cement them to the formers.

After the joints are dry, cover the fuselage from former A through D with straight grain 1/64" indoor balsa sheet. Cover as large an area as possible at one time so that the number of cement joints will be kept to a minimum. It may be necessary to hold the 1/64" balsa in place for a short time by using pins until the cement partially dries. The rear hook for rubber power should be cemented securely in place to former G. Bend the hook from about .025" diameter music wire.

Now from a 1/8" thick sheet of soft balsa, cut out shapes to suit the formers A and G. By following the drawing, it will be noticed that it is necessary to cement enough of these shapes together so that the portion forward of A and back of G can be cut and sanded to follow contours as shown on the drawing.

Cement a piece of 1/32" thick balsa between formers F & G on each side of the fuselage at the point where the stabilizer will be cemented in place. Sand the entire structure with a fine sandpaper, after cement joints are dry. Then cover with tissue from former A to former G. Water-spray to tighten tissue, then give entire fuselage two coats of thinned-out clear dope. The cockpit openings should be cut into the fuselage after the second coat of dope is dry.

WINGS. In order to make the wings, it will be necessary to cut 14 ribs X and 1 rib Y from 1/16" thick soft sheet balsa. The wing panels are shown full size on the drawing and should be cut from 1/32" thick sheet balsa of the "heavy" indoor variety. *Remember* that the wings are sheet balsa on top and bottom surfaces, and also right and left panels are required.

The upper wing has a center section which is placed between the right and left wings panels. Dihedral is built right into the upper wing when cementing the panels with the center section.

While making the lower wing panels, it will be noted that at the root a piece of soft balsa 1/4" thick is cemented to the rib and is shaped to the contour of wing. This 1/4" thick balsa is to be used later to suit fuselage contour so that the lower wing panels can be cemented snugly to fuselage during final assembly.

Mention might be made here regarding the building of the wing panels. It is advisable to cement the ribs in place on the upper panels first. Then after trimming, cement ribs to the lower panel. In this way, the panels can be pinned down while cement dries, thus preventing warp.

After the upper wing and the lower wing panels are made, sand smooth with a fine grade of paper that won't leave objectionable marks. Then give all wing surfaces two coats of thinned-out clear dope and sand lightly between coats.

RUDDER & STABILIZER. Both rudder & stabilizer are shown full size in the drawing. Make these pieces from a medium grade of 1/16" thick sheet balsa. After cutting the surfaces from the balsa sheet, sand to a streamline cross section. Give both rudder and stabilizer two coats of clear dope; sand with fine sandpaper between coats.

LANDING GEAR. The landing gear struts are made by cementing two pieces of 1/16" thick sheet balsa with a 1/32" thick sheet between them. Cross-grain the 1/32" balsa so that the grain will be at right angles to the 1/16" stock. The grain of the wood for the 1/16" thick balsa should follow the length of the strut. As shown on the drawing, the landing gear struts should be sanded to a streamline shape. Give struts two coats of *heavy* clear dope.

One inch diameter wheels are used for the landing wheels, and a 3/8" diameter wheel for the tail wheel. Use about .025" diameter music wire for the front wheel axles and also for the tail wheel. Use 1/8" thick balsa for the shape above the tail wheel.

ENGINE, PROPELLER & NOSE PLUG. Make the engine cylinders and the crankcase from 1/4" thick balsa sheet; use 3/16" sheet balsa for the rear ring. The hole thru the crankcase on the original model was made to suit the *Campus A-100* tank. After all parts of the engine are assembled and the cement is dry, give the engine two coats of black dope.

The propeller for rubber power is carved from a hard balsa block 1/2" x 1" x 5" long. After laying out the block and carving the blade shape, sand smooth and give the prop several coats of clear dope. When the clear dope has dried, sand lightly and give the prop two coats of silver dope. The prop shaft should be made of approximately .025" diameter music wire. The prop used for the *Campus A-100* engine was as recommended by the engine manufacturer and has proved satisfactory.

Use 1/8" hard balsa for building up the nose plug, and assemble with prop before bending the hook on the prop shaft. Provide a couple of washers between prop and nose plug for bearing purposes. The nose plug is given a couple coats of black dope, like the engine.

(*Turn to page* 54)

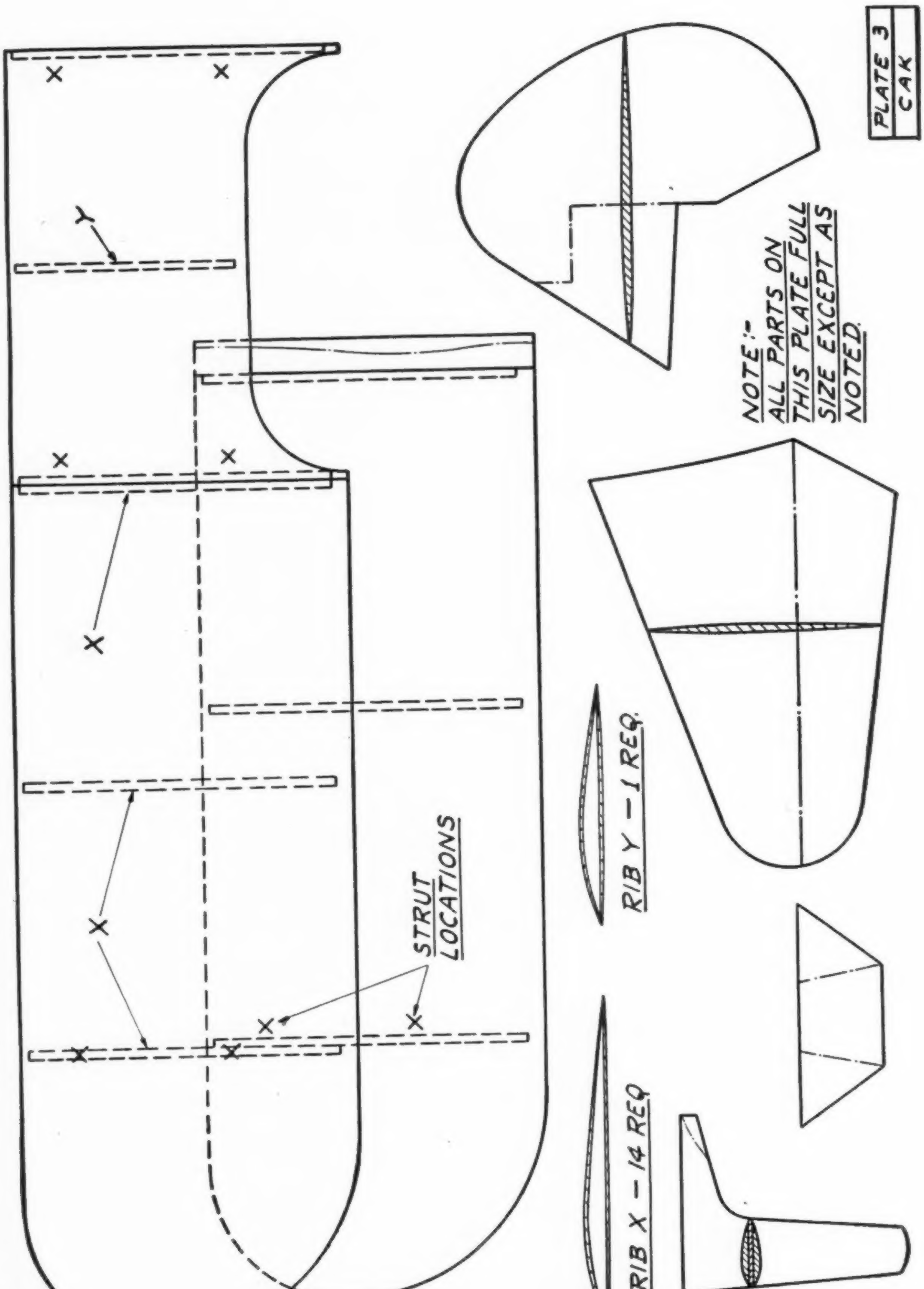
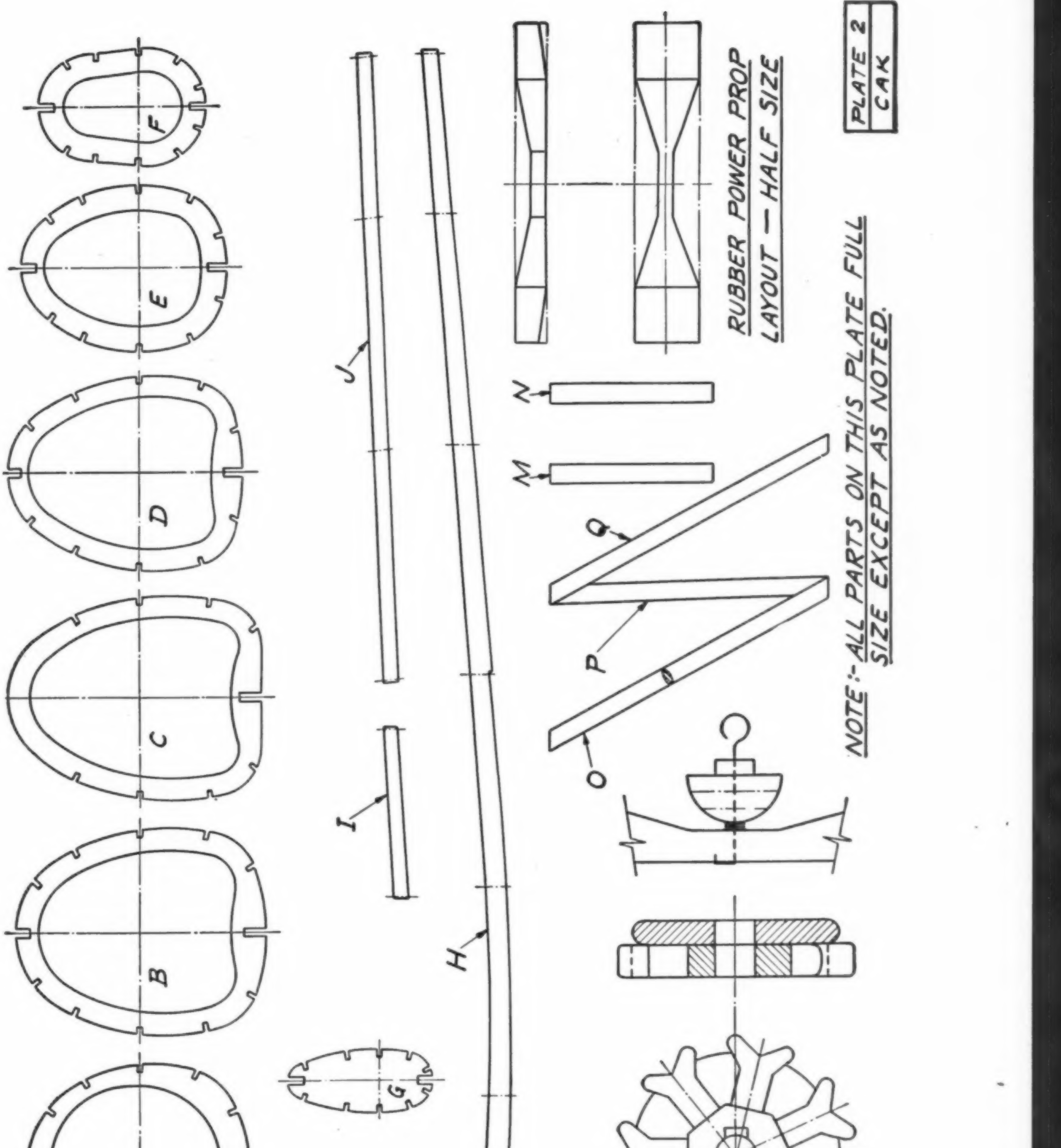
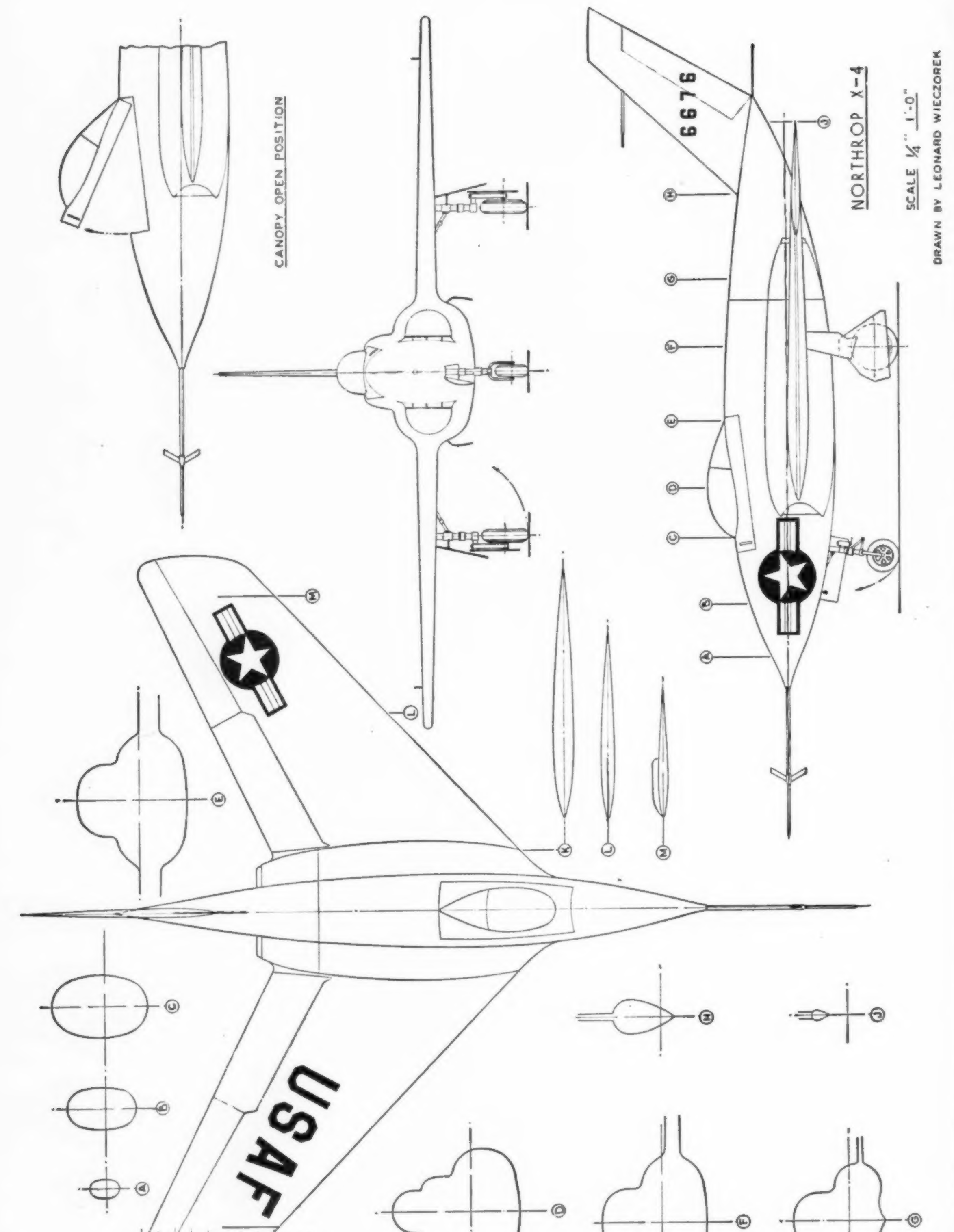


PLATE 3
CAK
NOTE:-
ALL PARTS ON
THIS PLATE FULL
SIZE EXCEPT AS
NOTED.
STRUT
LOCATIONS
RIB Y - 1 REQ.
RIB X - 14 REQ


A
B
C
D
E
F
G
H
I
J
M
N
O
P
Q
RUBBER POWER PROP
LAYOUT — HALF SIZE
NOTE:- ALL PARTS ON THIS PLATE FULL
SIZE EXCEPT AS NOTED.
PLATE 2
CAK


NORTHROP X-4
SCALE 1/4" = 1'-0"
DRAWN BY LEONARD WIECZOREK
CANOPY OPEN POSITION
6676
USAF
1/2" SQUARES

ON October 14, 1947, Captain Charles Yeager, U.S. Air Force, flew faster than the speed of sound in a Bell X-1 research airplane. Dr. Jerome C. Hunsaker, Chairman of the National Advisory Committee for Aeronautics and world-renown aeronautical scientist, has compared this flight in historic importance with that of the Wright Brothers on December 17, 1903. And yet, to the layman, the flight of the Bell X-1 beyond the speed of sound is one of the most misunderstood events in aviation history. To research scientists, the flights of the *Northrop X-4*, our Plane of the Month, may have far greater technical significance, yet this new research airplane is not even capable of supersonic speed!

To explain this seeming paradox, it is important to study the words of Dr. Hunsaker very carefully, for the flight of the X-1 brought aeronautical science to the same threshold as that of the Wright biplane: it proved "it can be done" and nothing more. The science of aeronautics was no richer on December 17, 1903, than it was on December 16, 1903; nor was it richer on Aug. 14, 1947, than on August 13, 1947. These two flights were simply milestones, little index cards in a huge filing cabinet of scientific information. Unto themselves, they did not contribute to the scientific knowledge of man.

But the flights that followed contributed immeasurably to aeronautical science. First there were gentle turns, then complete circles, then shallow dives and zooms, then stalls and recoveries: the real work of building a science was under way! For it was what happened *after* these two historic flights that comprised the real contribution of these pilots and airplanes to aeronautics. Briefly, it was the "filling in" of gaps left by these initial flights that made the subsequent flights real scientific research.

After the announcement of a supersonic pilot's flight, the question of the layman immediately was: "How *much* faster than sound did he go?" And here is the key to the misunderstanding of the layman: the scientists were not interested in how much *faster* than sound the X-1 could go! After Yeager had reached supersonic speed the scientist lost interest for he had already passed the *transonic* zone, and that was and is the greatest area of interest to the research scientist and the aeronautical engineer alike!

Man had accumulated a vast fund of knowledge and experience with supersonic speed many years before "Chuck" Yeager watched his Machmeter slip past one. Rifle bullets of the Civil War actually traveled at supersonic speed and Ernst Mach, the Viennese professor, laid down the groundwork for the phenomenon bearing his name, while experimenting with artillery shells well before the turn of the century! Wartime aircraft rockets, the well-known "bazooka," the fabulous Nazi V-2 weapon and dozens of other devices had traveled at two and three *times* the speed of sound long before the Bell X-1 ever flew! So, it was not the mystery of supersonic flight that intrigued the scientists, nor does it today. Rather, it is the mysterious transonic zone, which lies between about 85% and 115% of the speed of sound, that baffles modern aeronautical science.

The speed of sound in air at sea level, under standard atmospheric conditions, is 760 mph. That is the speed at which a shout moves from your mouth to the ear of a friend down the road. It is the fastest speed with which one molecule of air can pass along a slight disturbance to the molecule next to it. If this disturbance is strong enough to move at supersonic speed, the molecule cannot sustain the impact of its neighbor without being squeezed slightly in the process. Thus, the molecule is compressed and the phenomenon of "compressibility" takes charge. This compression occurs exactly at sonic speed, which has been defined as Mach No. 1.

However, it is not the compression that creates the problem. Air can be easily compressed, as in the ordinary automobile tire, the air rifle, the toy balloon, etc.; but it can be maintained compressed only with great difficulty and it requires strong tubes, a rugged rifle and a good-quality balloon to hold this air in a compressed state. Once that tube is punctured, the rifle trigger is pulled or the balloon stuck with a pin, the compressed air reacts violently by *expanding* to atmospheric, or free-air pressure. It is this expansion of compressed air that creates a "shock wave," *not* the initial compression.

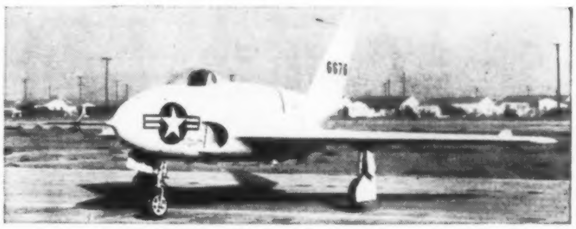
The whole science of aeronautics has been built on one simple mechanical action: the acceleration of air over the upper surface of an airfoil. That is the basis of lift, which is the basis of aviation! All that we have succeeded in doing in the 46 years since man first flew is in accelerating this air faster over a given distance. The speed of this air over the curved upper surface of an airfoil got faster and faster and faster through the years until, when it reached 760 mph under standard conditions, a molecule was compressed slightly under the pressure and a whole new era of science was born!

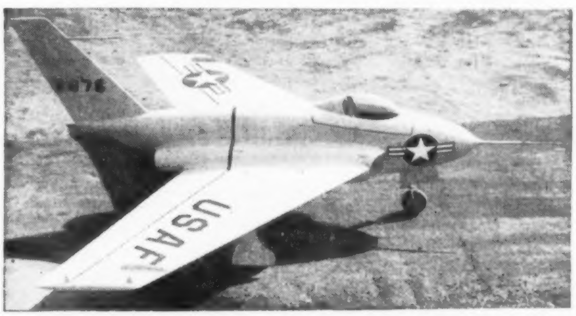
But after this air has been speeded up over the top of the airfoil, it must slow down over the aft portion of the airfoil

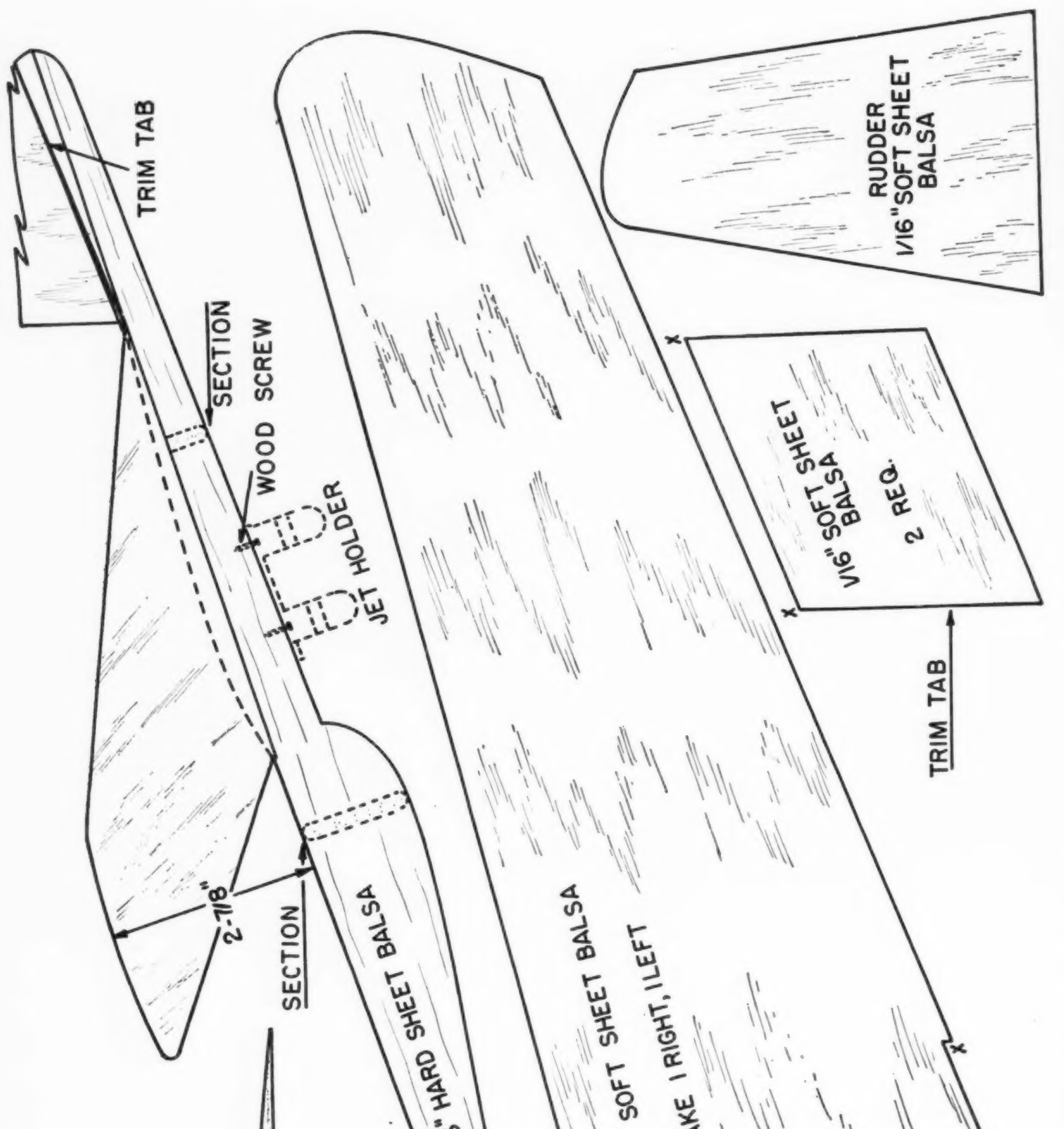
(*Turn to page 44*)

Northrop X-4

by ROBERT MCLARREN



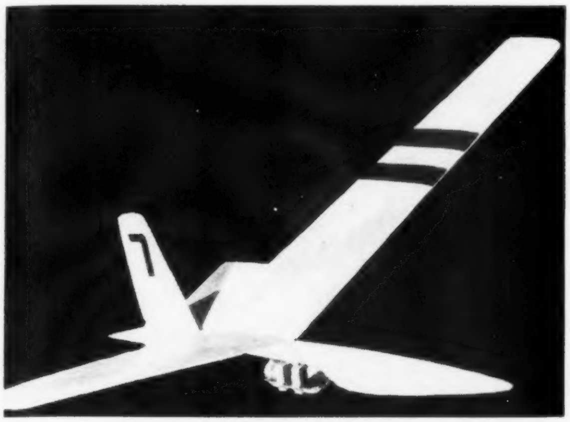


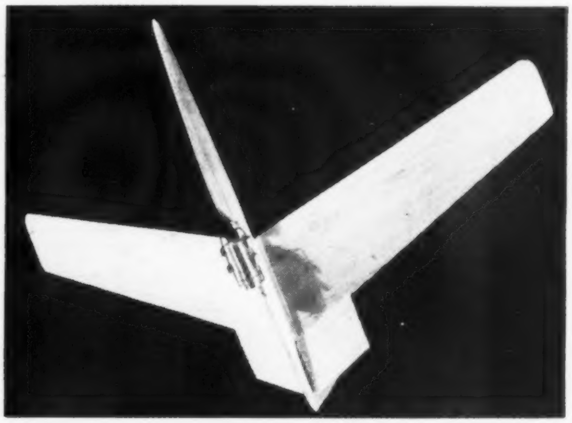


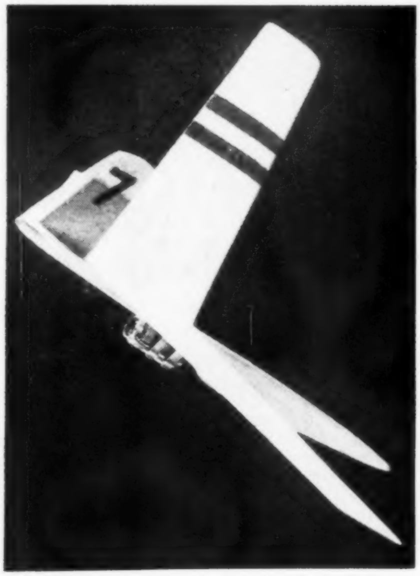
FOR JETEX 50 OR 100

PLANS FULL SIZE FOR 50
1/2 SCALE FOR 100

F.V.B.E.







little swoosh

by FRANK EHLING

WITH the *Jetex 50* now available, a new class of models will make its appearance. These models are small and can be built in a short time. With the use of the *Jetex*, the extras such as props, fuel tank, batteries, fuel shut-off, and timers, can be eliminated; thus the actual time you can spend flying will be increased. *Jetex*-powered models are fun! However, the power of these units should not be underestimated, for the thrust increases as the flight progresses.

Our model of a flying wing is easy to adjust; the trim tabs are at the center of the wing (not on the tips as with the conventional sweptback type) and the adjustments need not be as accurate as when the wing is sweptback, since in this latter case the trim tabs are so far out from the center of the wing that a slight misadjustment will quickly throw the ship into a spin.

While there isn't much to be said about this design, let it be mentioned here that the usual care should be exercised if the best performance is to be expected. Be sure to get both wings alike in weight and cross section. Cement all parts well, and check while drying to see that the parts don't warp before the glue hardens.

To start work, select a piece of straight-grained wood and cut the fuselage to shape; sand it to the cross section shown on the plan. Dope the fuselage and when dry, sand well so that the wood won't pick up dirt. The *Jetex* holder can now be screwed in place, and be sure that this is lined up and true. This operation is much the same as drilling a hole in the nose block of a rubber job, and careful work is just as essential here.

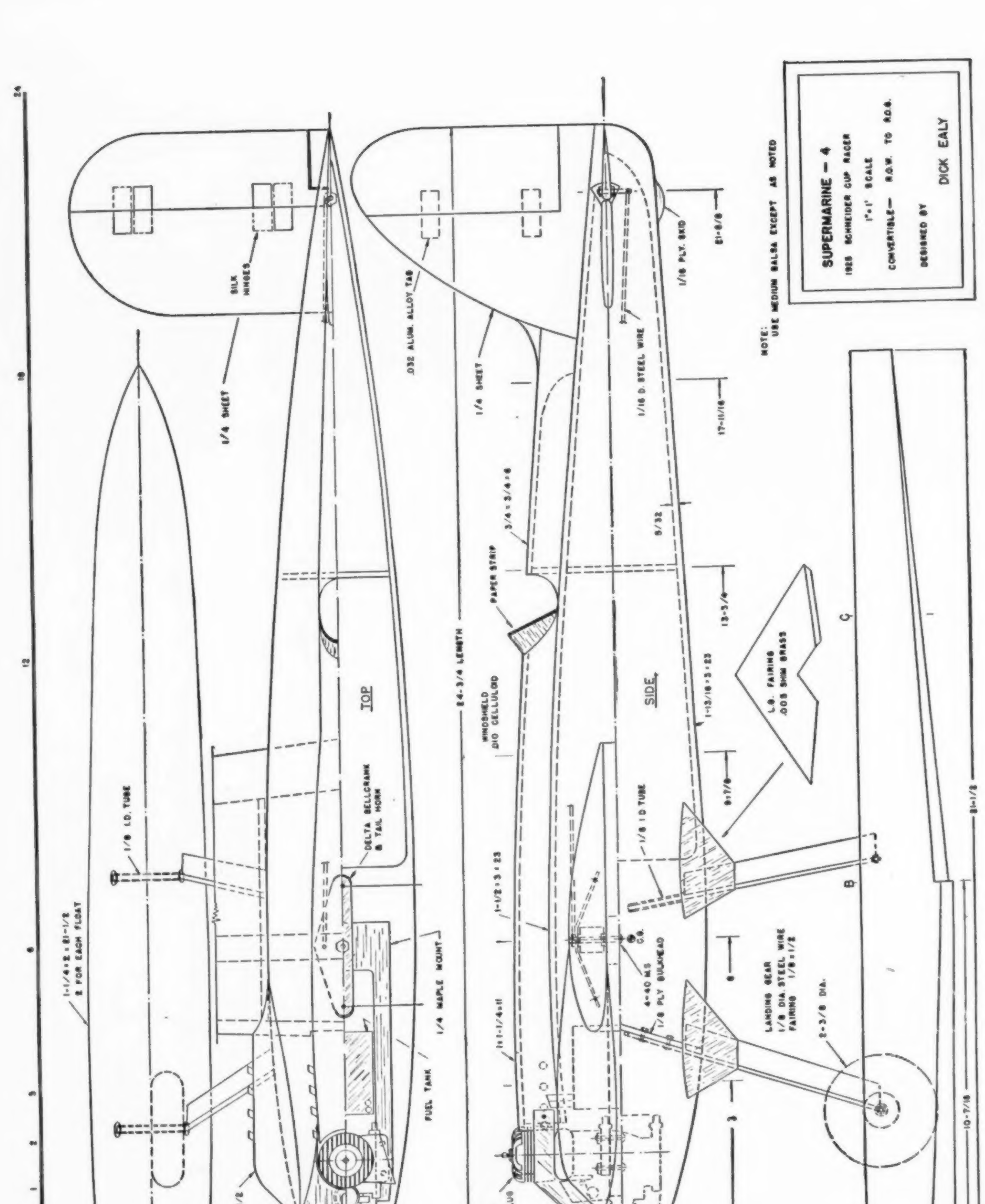
The wing is next, and should be cut out of soft balsa, using the drawing as a pattern. Sand the wing to the section shown, but be sure that you make one panel right and the other left. Bevel the ends and cement the panels together with the correct dihedral. At this joint an extra coat or two of cement should be added. Dope and sand the wing as you did the fuselage, then cement the wing in place and check to see that it lines up true with the fuselage.

The rudder is cut out and sanded, and can then be cemented in place, checking to see that it does not warp. The trim tabs can now be cut and cemented in place; these should be cemented lightly until a flat glide is obtained, and then cemented firmly in place.

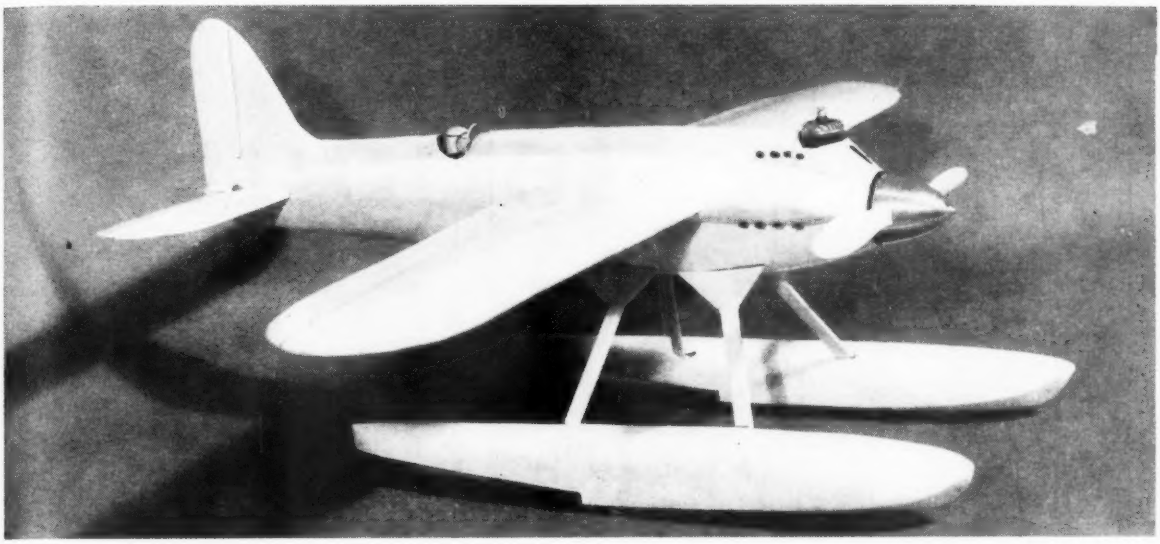
The entire model can now be given a coat of glider polish and resanded, as this will assure a better flight and glide.

To start flying, the model should be glided and the trim tabs slightly readjusted until the glide is as flat as possible without

(*Turn to page* 44)



SUPERMARINE — 4
1925 SCHNEIDER CUP RACER
1"=1' SCALE
CONVERTIBLE— R.O.W. TO R.O.G.
DESIGNED BY
DICK EALY
NOTE: USE MEDIUM BALSA EXCEPT AS NOTED
SILK HINGES
1/4 SHEET
.032 ALUM. ALLOY TAB
1/16 PLY. SKID
1/16 D. STEEL WIRE
TOP
SIDE
24-3/4 LENGTH
WINDSHIELD .010 CELLULOID
PAPER STRIP
L.G. FAIRING .005 SHIM BRASS
DELTA BELLCRANK & TAIL HORN
1/4 MAPLE MOUNT
FUEL TANK
OHLSSON .29
R VALVE GLOW PLUG
1-3/4 DIA. SPINNER
OHLSSON PROP. 9 DIA. × 6 P.
LANDING GEAR 1/8 DIA. STEEL WIRE FAIRING 1/8 × 1/2
4-40 MS
1/8 PLY BULKHEAD
2-3/8 DIA.
1/8 I.D. TUBE
1-1/4 × 2 × 21-1/2 2 FOR EACH FLOAT



Supermarine S-4

by DICK EALY

THE age of streamlining is an accepted fact today. Everything from bicycles to baby carriages have now adopted this so-called modern idea.

Aviation enthusiasts know that streamlining has been practiced for many years in the production of aircraft. Actually, one of the first airplanes to be completely streamlined was the *Supermarine 4* Schneider Trophy Racer designed by the late R. J. Mitchell. This was the first of the famous Supermarine Racer series that eventually resulted in the *Spitfire*, also designed by Mr. Mitchell, and acknowledged by all as the deciding factor in defeat of the Luftwaffe, in "The Battle of Britain."

In 1925 the Supermarine factory designed and built the **S-4** as part of the then recently inaugurated high-speed program. It was fitted with a 700 hp Napier *Lion* motor with three cylinder banks. It was a middle-wing cantilever monoplane with no external bracing. The central structure of the fuselage was built of steel tubes and to this were attached the engine, the rear section of the fuselage, the one piece wing and the floats. Except for the metal floats and the central structure, the ship was of wood, including the covering.

On September, 13, 1925, the *S-4* established the World's speed record at 226.6 mph. The *S-4* was sent to Baltimore, Md., to compete in the Schneider Trophy Contest, but was demolished in an unfortunate accident on a test flight.

The *S-4* makes a beautiful and practical controline **1" to 1'** scale model plane. An *Ohlsson .29* rotary valve motor is used and fairs in nicely with the center motor bank of cylinders. The original model was flown with wheels and then converted to a seaplane.

CONSTRUCTION. Before starting construction, note that the model is drawn 1/3 of full size. Make the fuselage first by drawing the side view and cutting blocks to profile shape. Cut the fuselage as shown in top view. Use a knife to carve away the corners as shown in cross-section views. Top half is hollowed out with a gouge to about 5/32" wall. The bottom half is left solid on front, and also hollowed out from station 7-5/8" to rear.

Bend landing gear from 1/8" dia. steel wire and attach to plywood bulkhead as shown in front view. Bulkhead is 2-3/16" wide and a slot is notched in the bottom to receive the landing gear assembly. Use cement liberally and seal hole with plastic wood. If floats are to be used, install tube bushings for rear struts.

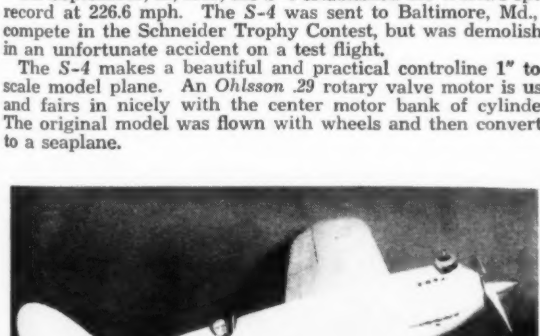
Make motor mount from 1/4" maple sheet. The motor hold-down bolts are held in place by soldering them to a piece of tin or brass strip. Cement in place on bottom of mount. Attach 4-40 machine screw to mount with a nut, for the wing and bellcrank.

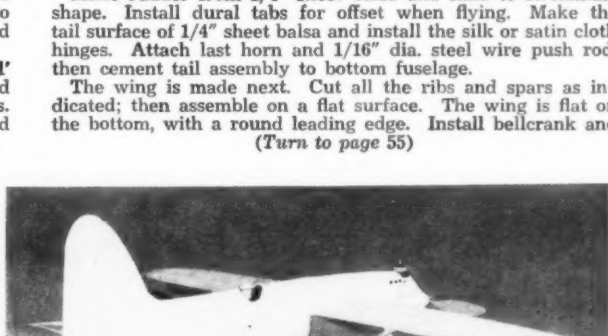
Cement mount in place. Hollow out bottom to receive motor. Cut hole in fuselage top for motor. Install gasoline tank. Make center motor fairing and the head rest and cement both in place.

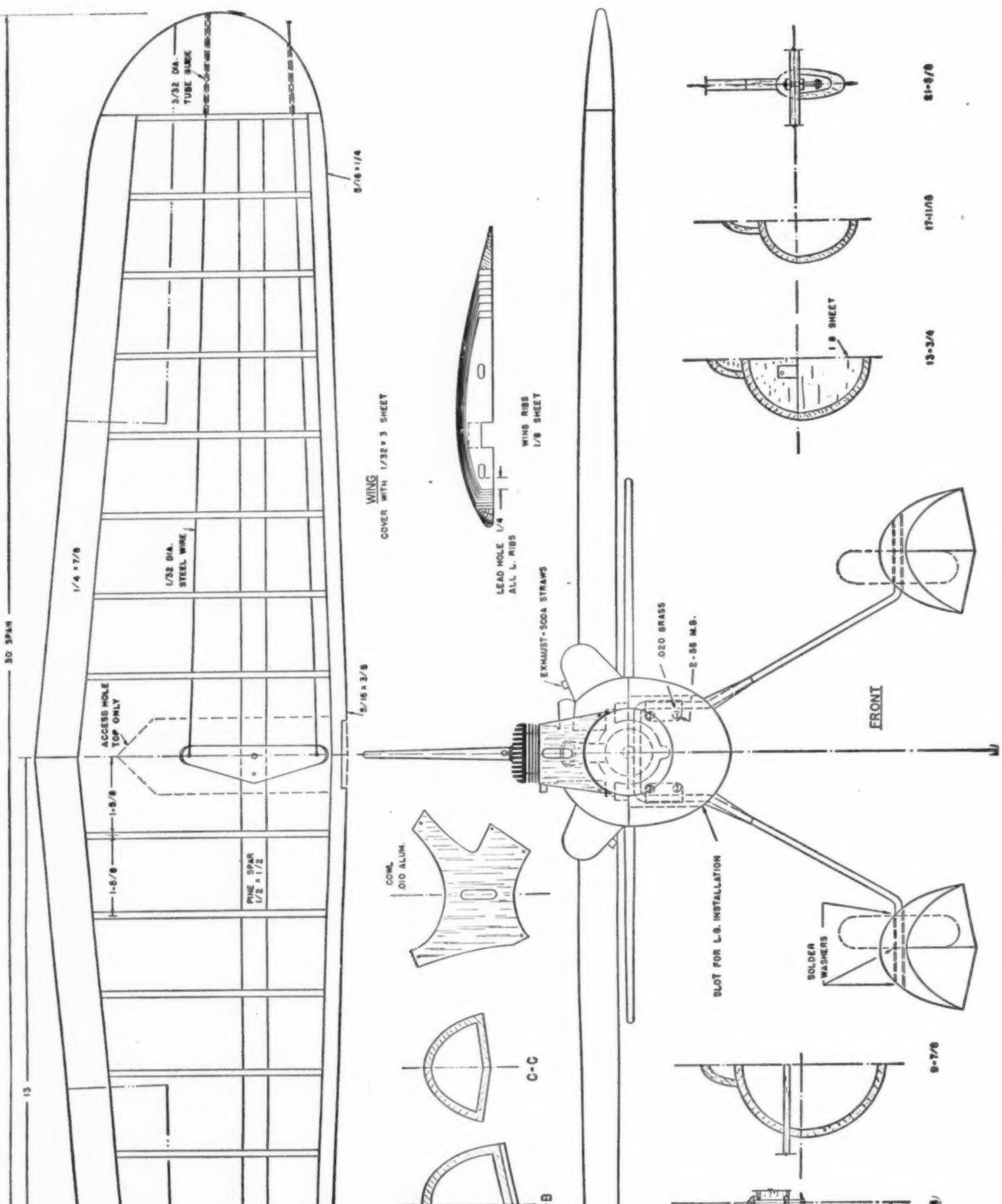
Make rudder from 1/4" sheet balsa and sand to streamline shape. Install dural tabs for offset when flying. Make the tail surface of 1/4" sheet balsa and install the silk or satin cloth hinges. Attach last horn and 1/16" dia. steel wire push rod, then cement tail assembly to bottom fuselage.

The wing is made next. Cut all the ribs and spars as indicated; then assemble on a flat surface. The wing is flat on the bottom, with a round leading edge. Install bellcrank and

(*Turn to page* 55)







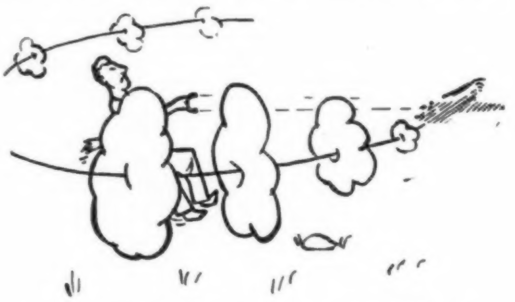
30 SPAN
13
ACCESS HOLE TOP ONLY
1-5/8
PINE SPAR 1/2 x 1/2
TAPER TO 1/2 x 1/4
SOLID TIP 3/8 THICK
1/4 x 7/8
1/32 DIA. STEEL WIRE
3/32 DIA. TUBE BUSH
5/16 x 1/4
5/16 x 3/8
WING
COVER WITH 1/32 x 3 SHEET
WING RIBS 1/8 SHEET
LEAD HOLE 1/4 ALL L. RIBS
EXHAUST-SODA STRAWS
.020 BRASS
2-56 M.S.
FRONT
SLOT FOR L.G. INSTALLATION
SOLDER WASHERS
COWL .010 ALUM.
5/32 WALL
A-A
B-B
C-C
1/8 SHEET
17-11/16
13-3/4
9-7/8

by **D. D. ANTONELLI**

model "characters"

The author describes and sketches modelers you will find at most every field

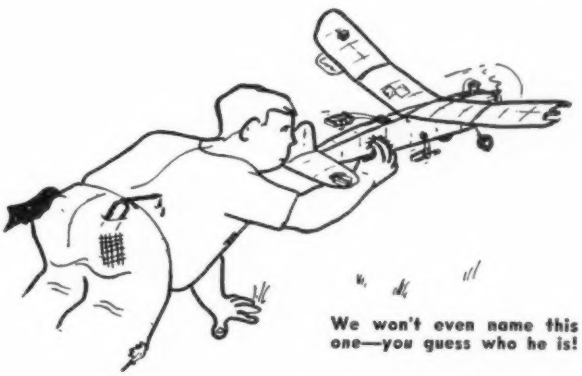
***Glider Builder* launches his plane . . . and arm**



***Speed Demon* having tug-of-war with a whirlwind**

***Midget Builder* ". . . made the greatest number of flights"**

***Builder-With-His-Girl* will never start an engine *this* way**



We won't even name this one—*you* guess who he is!

EVERYTHING we do," says the psychologist, "is an expression of our personality." Well, anyone who has visited a model flying field can back up that statement. He is sure to have seen plenty of personality in evidence—even some flying about in the air. Of course, rather than say that the average model builder has a lot of personality, people are more apt to remark that he is really a "character." Off hand, I can think of some ten types of model "characters" I have observed at flying fields again and again. How many can you recognize?

First, since this species is the most numerous, we notice that blighted specimen of mankind, the *Omniscient Onlooker*. This guy knows everything (especially concerning the adjustment and flying of model airplanes), but does nothing in the way of building or flying models himself. He often makes sneering remarks about the flying technique of the perspiring modeler, or if the model is quickly sent aloft, he will comment, "Hmm, she's pretty well balanced, but you should have seen the way my BROTHER's plane flew."

Then we have the modelers and their handiwork. Our first modeler is the *Monster Builder*. This fellow generally comes down to the field in an auto which seems to have sprouted wings like an experimental "Skycar." Actually this is just the wing of the *Monster Model* protruding through the car windows. After spending the better part of the day assembling his gigantic model, the *Monster Builder* is at last ready to launch his craft. The Monster itself, engine reverberating, lumbers across the field for a take-off. Groaningly she clears the ground, banks, and brushes the roof of an ice-cream truck, disappearing behind it with a splintering crash. Shivering uncontrollably, the *Monster Builder* takes his hands from his ears and walks slowly toward the wreckage. "G-G-Guess it needed a little more wing area," he mutters.

That was a sad case, but the gloom is soon dispelled, for the *Midget Builder* has arrived on the field. A short, snappy

(*Continued on page* 40)

by **ROY L. CLOUGH, Jr.**

REBUILD IT? ☒ Yes ☐ No

PART TWO

ENGINES converted to skirt-porting (as described in Part I) generally run much cooler and sometimes show another surprising characteristic. The reworked *Bond* shown in the photo herewith has two separate lean positions for the needle valve! The first is used for starting and gets the engine going very readily. As soon as it is running (and it goes at a good clip on this setting), the mixture is richened-up until the motor runs four cycle, after which a slight additional opening of the needle valve results in a surprising increase in rpm as the engine leans out on its high speed level. Other data on this job is as follows: all ports have been increased 30%; compression raised 20% by substitution of *G.H.Q.* head; original timer replaced by one from a *Pacemaker;* intake tube placed at front of engine to take advantage of ram effect; highly efficient *Phantom* needle valve is used; and a new bearing installed. The original factory rating of this motor was 1/3 hp at 7000 rpm. We have never checked the horsepower of the rebuilt job but it winds up to over 11,000 rpm with a 9-10 propeller. A particularly happy example of reworking, the engine has no critical adjustments, starts with a flip of a bare finger and runs very steadily. The model has never been clocked with contest accuracy, but it hits over 90 mph.

With quite a few engines it will be found possible to employ a trick known as "crankcase plugging." This consists of filling up any space which may lie between the end of the crank-throw and the rear cover plate, with a plug of aluminum or hard fibre. The effect of crankcase plugging is to increase induction pressure by increasing the amount of expansion which takes place when the piston goes up. Make certain the plug is well anchored and that the method of attaching it produces no leaks in the case. It goes without saying that you must check to see that the piston skirt does not hit the plug on the bottom of its stroke.

On some engines where it is not possible to use a plug, it may be possible to wall off the upper part of the inside of the piston, above the wrist pin bosses. A disc of aluminum, carefully pressed into a turned groove is all right. Care should be used to avoid distorting the piston, and a small hole (not over 1/64") should be made in the disk to allow for expansion of air trapped behind it. If you are trying for very good balance, do this before adjusting the counterweights.

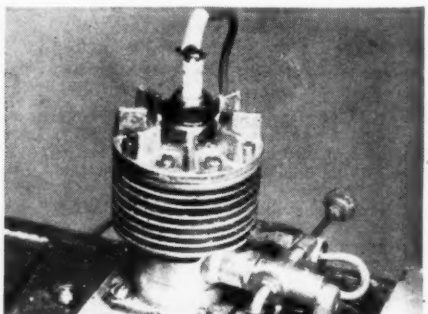
It is frequently desirable to get a picture of the exact size and shape of the combustion chamber when the piston is at top center. To do this, remove the spark plug and turn the piston up just far enough to close the exhaust ports. Pour melted paraffin wax in the plug hole, then bring the piston up to top center, squirting out the excess wax. Allow enough time for the wax to harden, then take the cylinder off and push out the plug, trimming off any excess wax which may have run up into the spark plug hole; there you have a solid model of the engine's head space, accurate to within a few thousands.

When fitting or adapting a timer to an engine which is to be operated at high speed, steadier operation will be had if the cam is worked over in such fashion that the points remain closed for 280 to 300° of shaft rotation. This allows the coil more time to soak up a good charge. Don't be afraid to experiment with condenser sizes; and in figuring the timing, remember that the plug sparks when the points open, *not* when they close. We favor using the smallest possible timer point gap, but there are others who disagree, so we suggest using your own judgement on this score. The ignition system should be of good quality; poor coils cause endless grief Even when the coils work after a fashion, they do not present a true picture of the engine's capabilities. We favor the Aerospark *Quality* coil due to its ability to supply sparks at any possible speed which could be expected of a rework job.

The use of glow plugs in reworked engines is a subject we are going to skip, aside from making a negative recommend. The reason being that glow plug operation is more critical, a special science in itself, and may not always reveal a good picture of what is going on inside the engine. Spark ignition, on the other hand, is very flexible, more positive, and permits a wider range of fuels to be tried.

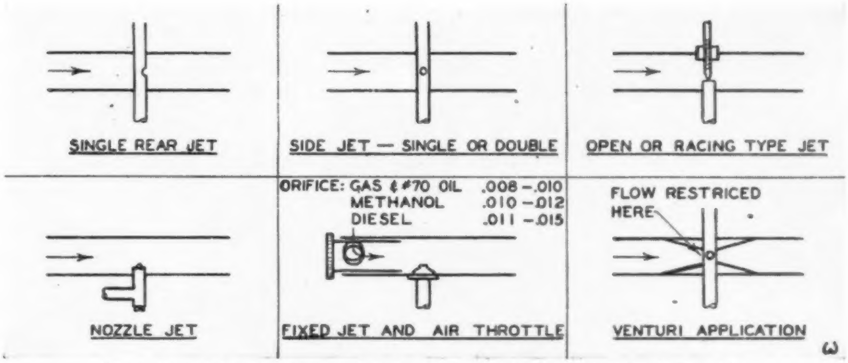
We are not inclined to recommend conversion to diesel of any except a very few engines. After converting half a dozen various makes, the conclusion has been reached that ordinary spark ignition designs lack the beef needed to take the shocks of "detonation ignition." The best diesel conversions are the ready-mades sold for changing over *Arden* engines, and one of the best of these units has a contra-piston for variable compression—a highly desirable feature. The *Atom* engine makes a very good diesel. We ran one for over two months with nothing in the head but an aluminum washer and cardboard gasket held in place with a 2-56 bolt. A neatly turned plug could be made if desired. The compression is located by trying the engine with the cylinder screwed at various depths in the crankcase. When found, mark it, remove and put in or take out gaskets to fit. A 50-50 castor-ether formula gave us the

Plane used to test hot "reworks"—plenty of wing area and large cowl to hold gadgets



Bond .57 rebuild job is a real performer

More suggestions on putting those old "dogs" back to work —converting ignition engines to diesel operation



Try various styles of mixture control to see what works best on each rebuilt engine

best results. The jet hole should be enlarged to .010 or .012 to compensate for the higher viscosity of the fuel.

One thing to remember about diesel conversions: if they don't start after three or four flips, they are unlikely to run at all. Check the source of the trouble. Never put a diesel—conversion or otherwise—on an electric or other starter in the hope that it will run if it is churned over fast enough. It won't. More likely it will slam a gob of fuel into the head and break a con rod or crankshaft!

One of the safest rework jobs for a beginner to attempt is the conversion of the *Diesel* engine from 3-port to rotary induction. Power tools are not necessary. Bore a hole from the crankpin end lengthwise into the crankshaft with a 5/32" drill, to a depth not exceeding two thirds of the bearing surface. The shaft is not hardened, so this is very easy, but be sure the hole is centered. Next, bore a 3/16" hole down through the top side of the main bearing as close to the crankcase as practicable, and tap 5/16" x 24. Remove the needle valve body from the intake tube and screw this into the hole. Note how far the tube projects into the bearing and remove and trim the body to the proper length. Push the crankshaft *straight* into the main bearing—the sharp forward section will knock off any drill or tapping flash projecting down from the hole. Replace the intake tube and turn the shaft until the crankpin is aligned with the left mounting lug, as viewed from the rear. Mark the shaft with a punch dropped down the intake tube (a light tap is sufficient), remove and drill a 5/32" hole. (Align the pin with the right hand mounting lug if you wish the engine to operate left-handed.) Clean off all burrs before assembly. The shaft hole may be squared off, but don't make the hole too large. The original intake hole at the rear of the case may be filled with aluminum solder and ground off flush, or a short length of stud can be screwed in to seal it. If this last is done, be careful not to distort the cylinder sleeve by screwing the plug in too far.

A conversion of a *Rogers Ram* to a rotary valve air engine, which does about 1200 rpm on 90 lbs. pressure with a 14" prop, is shown in one of the photos accompanying this article. The shaft was plugged at the rear, another hole drilled opposite and to one side of the rotary valve and air lines connected strategically. One side of the crankshaft was filed flat to act as a pressure release, (the air also exhausts through the old intake and exhaust ports) and the rear case cover spaced with washers for crankcase relief. When making a conversion of this sort, make sure the air is not admitted to the cylinder before top center. A pressure release on the crankshaft is necessary because the exhaust ports do not exhaust sufficiently. (See "Expansion Engines" M.A.N. June, 1948.)

For a really serious job of air conversion, replace the original cylinder with one of steel or brass and retain the air pressure to the bottom of the stroke.

Fuels and lubricants are a vital consideration in reworked engines, perhaps even more so than in standard makes in good condition, the reason being that the rework job will be operated at higher speeds than the maker intended, and probably at higher temperatures. Any critical lubrication problems will show up in a hurry and for this reason we suggest that the only lubricant that should be used is castor oil, preferably of the fortified variety.

Do not assume, however, that a methanol base fuel is required merely because the engine has been hopped-up. If the compression ratio is 7-1 or less, we suggest the following formula: Naptha (Energine lighter fluid is OK) 3 parts; castor oil, 1 part; ether, 1/10th part. To each quart of this mixture, add either 2 cc of amyl nitrate or 10 cc of amyl acetate

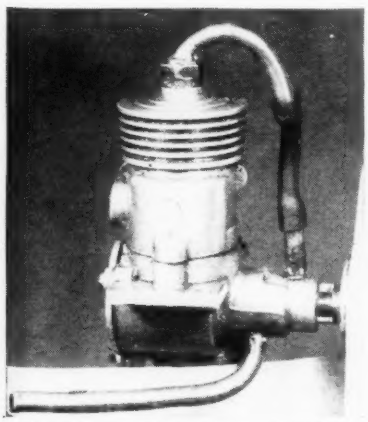
This fuel works very well and we have come to prefer it to ordinary white gas mixtures. If it runs too cold, omit the ether, but add an equal amount of nitro-propane.

For compression ratios above 7-1, use any good methanol fuels. In either case, however, it may be necessary to add more castor oil to the fuel to get optimum performance. Don't place too much reliance in ether as a "souping" ingredient. Its chief value lies in increasing volatility and lowering combustion temperatures. If too much is added, detonation is apt to result.

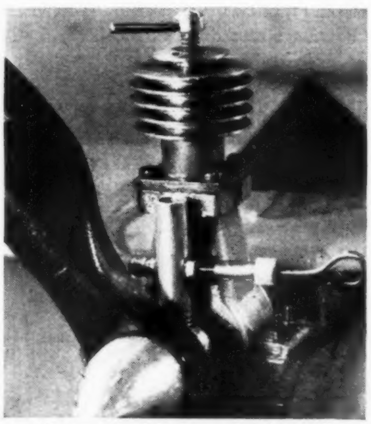
For diesel engines, the following fuel gives good results: 1 pint ether, 1 pint kerosene, 1 pint 50, 60, or 70 S.A.E. oil. To this add 20 cc amyl acetate and 2 ounces of heavy mineral oil. This is, of course, for variable compression engines. If your engine will not run steadily on it the trouble is probably poor compression sealing, so add more 70 oil and try *easing off* on the turn-down screw.

Old die-cast motors which just won't run any more due to

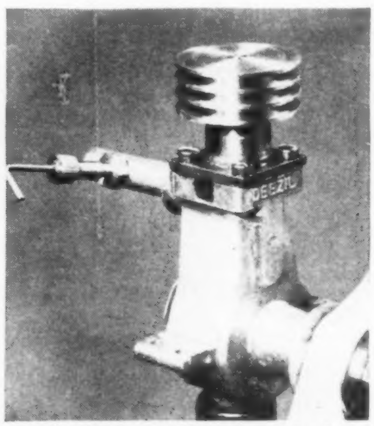
(*Turn to page* 41)



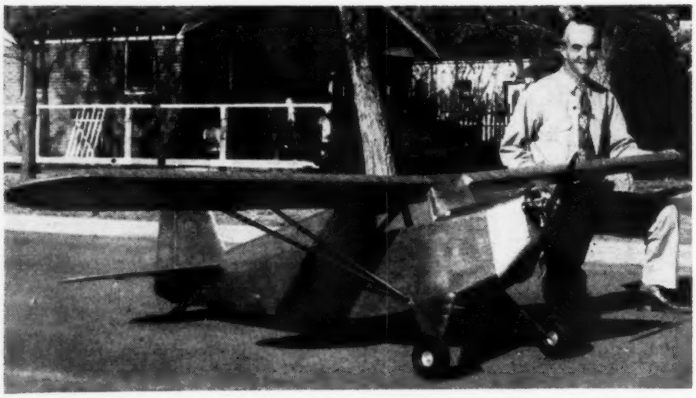
Worn-out *Rogers Ram* runs on compressed air



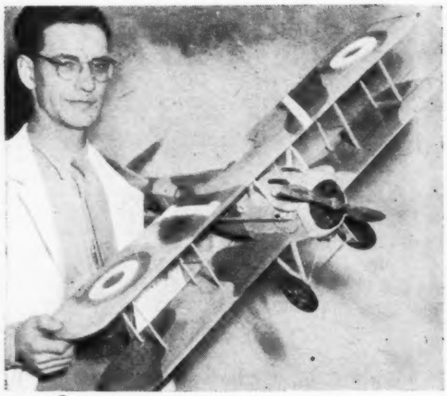
It's easy to add rotary valve to *Deezil*



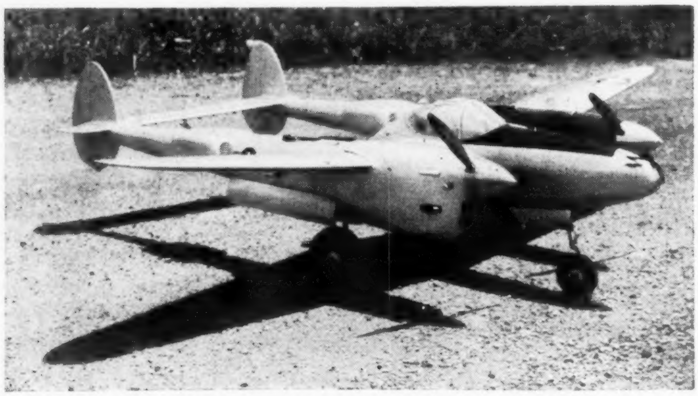
Another *Deezil* with fixed comp. head



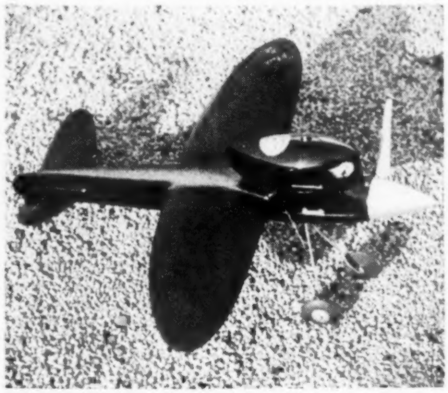
No. 1 Scale *Rearwin* radio control model can almost carry builder, J. B. Oberthier



No. 2 Major Frank F. Marsh with scale controline *Spad*



No. 3 Two *Super-Cykes* propel this beautiful P-38L, built by Richard Tichenor



No. 4 Al Baird put a super finish on this speedster

air ways

News of Model Airplane Experimenters From All Over the World

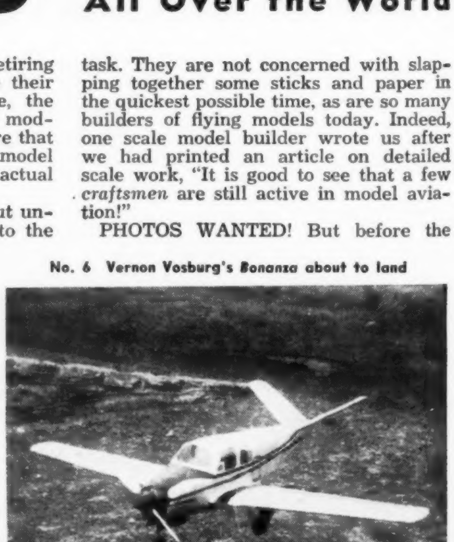
OUR FEATURE ARTICLE this month gives comprehensive plans and instructions for producing a detailed non-flying scale model. This is a type which you don't see too often, and consequently modelers, in general, don't give the type much thought. However, we suspect that there are more of these beautifully finished and accurately scale models made than is generally supposed. It appears that builders of such models are a retiring lot and tend, in general, to "hide their light under a bushel." Of course, the Beauty Events bring some of these models out, but most such events require that the ship *must* fly. Needless to say, a model such as *Mayfly* is not intended for actual flight.

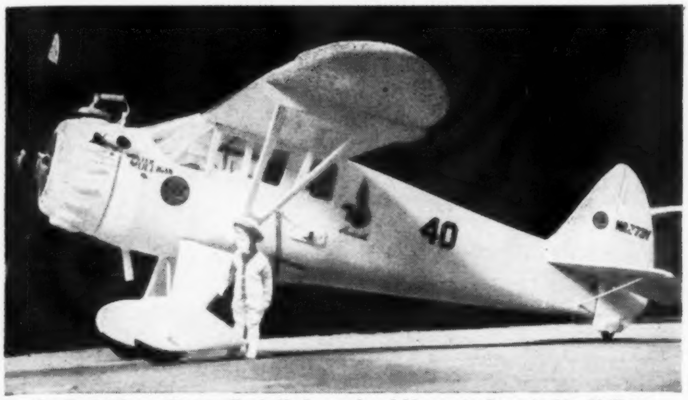
Builders of this class of model put untold hours of painstaking work into the task. They are not concerned with slapping together some sticks and paper in the quickest possible time, as are so many builders of flying models today. Indeed, one scale model builder wrote us after we had printed an article on detailed scale work, "It is good to see that a few *craftsmen* are still active in model aviation!"

PHOTOS WANTED! But before the

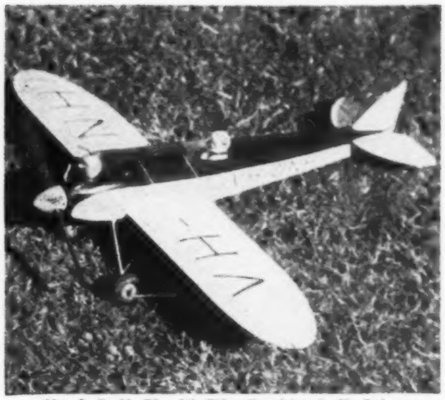
No. 5 Large glider flown successfully in Holland by F. de Wolf

No. 6 Vernon Vosburg's *Bonanza* about to land





No. 7 Ed Varca likes realism! He has reduced his son to fit scale *Mr. Mulligan*



No. 8 D. H. 71 with *Elfin* diesel by A. V. Coles

deluge starts, give us a chance to qualify this a bit. Our stock of certain types of photographs used for *"Air Ways"* is very low; of other types we have more than enough. In the latter category, comes controline models, particularly scale jobs. We have never been able to ascertain why builders of controline scale ships take such pride in their handiwork, while builders of free flight gassies, flying scale and contest rubber models, gliders, etc., think so little of their models that they seldom send in photos. Also, the pictures of controline jobs seem to be uniformly in quality better than those of other types.

Regardless of why this is the case, send in your snapshots of rubber-powered models of all types, gliders, free flight gassies (including scale), and pix of unusual projects, such as helicopters, flying boats, home-built motors and the like.

Briefly the specifications for photos usable in *"Air Ways"* are as follows: prints must be glossy and 4" x 5" or larger, if possible. We cannot use negatives or colored pictures. The pictures must be *very sharp* and clear, with a background that aids the subject—not detracts from it. We seldom use photos of kit models—*"Air Ways"* readers much prefer to see views of original designs. *We cannot return any shots sent to us for this column.*

That about covers it. Who has a good shot that meets these specifications? Well, *send it along!*

A SOURCE OF POWER, which can be a lot of fun, but which hasn't been widely used as yet is the *Jetex*. Now available in four sizes, *Jetex* offers all sorts of possibilities in scale models, composite jobs with jet and rubber power, jato takeoffs, flying boats, and so on. These units, like all model jet power plants, are entirely torqueless, but you can offset them as desired to obtain downthrust, sidethrust, etc.

Test flights may be made by cutting a regular fuel charge in half or even less. This way you can conserve fuel and still check performance.

A model utilizing the *Jetex 50*, newest and smallest of the family, is described on page 23 of this issue. Try it out, and we know you'll get a real kick from it.

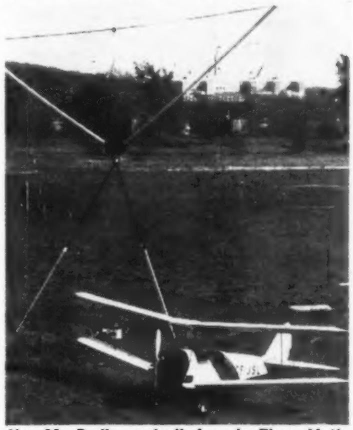
The giant "model" which appears in photo No. 1 is a radio control job built by J. B. Oberthier (709 Oakland Street, Plainview, Texas), who is also the proprietor of J. B.'s Hobby Shop. This ship, which is very nearly large enough to carry J. B. himself, has a wingspan of 10' 10" and is powered by an *O. K. Twin* engine. The entire model is constructed of bass wood and aircraft plywood and is covered with balloon cloth. Since satisfactory wheels were unobtainable, Mr. Oberthier made his own, including the metal hubs and the rubber tires themselves. When the photo was taken, R. C. equipment had not been yet installed, but all control surfaces have been made movable so that any combination of controls may be used as desired.

A World War I enthusiast with his scale *Spad* appears in No. 2. This shows Major Frank F. Marsh, of the Army Medical Corps (Percy Jones General Hospital, Battle Creek, Michigan), holding his authentically finished model powered by an *Atwood Glo-devil* engine, and it has proved to be an extremely able flier. Major Marsh noted that building model planes is not only a great form of relaxation but he finds it also helps to develop and maintain a steady hand—certainly an important consideration in his profession.

The beautiful scale P-38 controliner

(*Turn to page* 48)

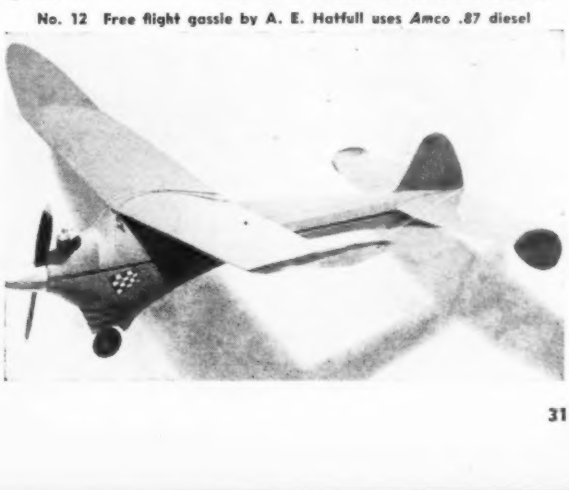
No. 9 Ben Rivera with his *Thermal Chaser*

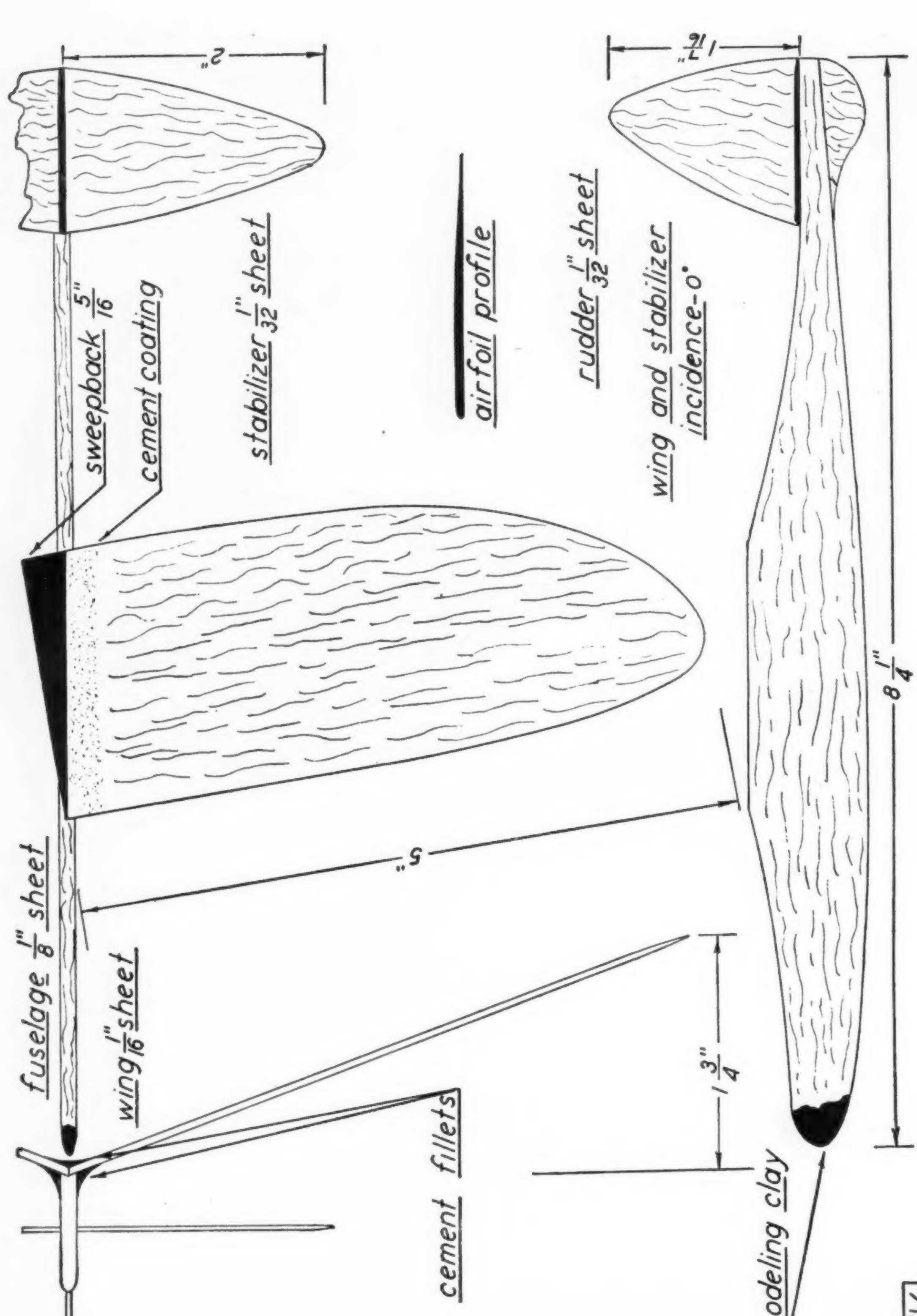


No. 10 Radio controlled scale *Tiger Moth* built by J. S. Luck. Power is a *Forster 29*

No. 11 *King Size*, an attractive Wakefield job by Clarence Mather

No. 12 Free flight gassie by A. E. Hatfull uses *Amco .87* diesel

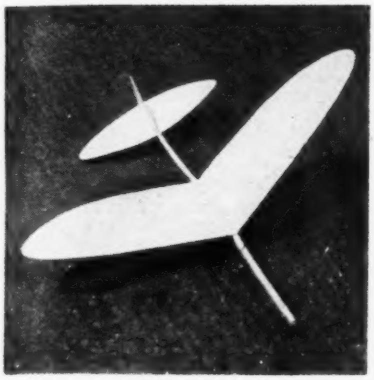


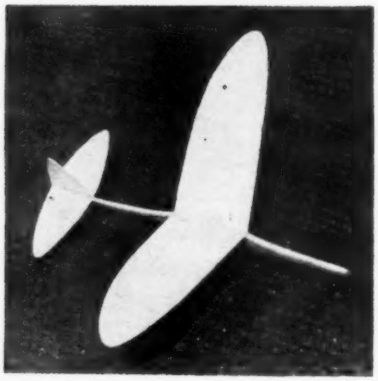


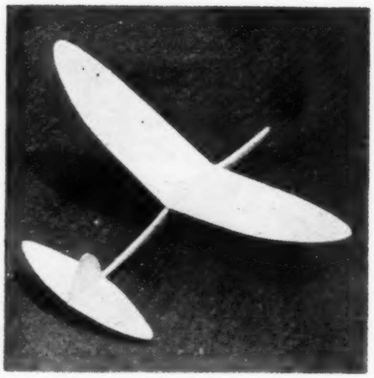
fuselage 1/8" sheet
wing 1/16" sheet
sweepback 5/16"
cement coating
stabilizer 1/32" sheet
air foil profile
rudder 1/32" sheet
wing and stabilizer incidence-0°
cement fillets
modeling clay
2"
1 7/16"
5"
8 1/4"
1 3/4"
W.V.

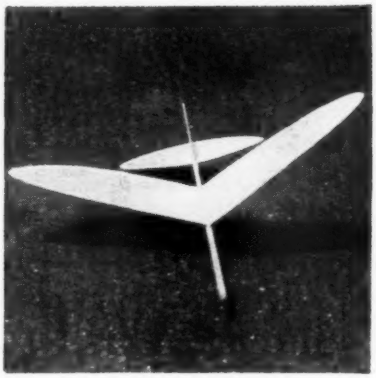
baby glider

by WILLIAM VASSALO









THE young model builder with his eagerness to fly a record breaker, has many times made the mistake of attempting to build and fly more advanced designs, while apparently exhibiting little knowledge of flying characteristics. To my dismay, I have seen many such builders at contests, after cracking up their ships, become utterly disillusioned with model building, in general.

With this in mind, I designed the elementary glider presented here, primarily for the novice. Many hours of entertaining fun can be enjoyed for only a small sum; if you are a fast worker, the glider can be completed within several hours.

Medium hard straight-grained balsa is used throughout. Using carbon paper, trace the outlines of the fuselage, wing, and tail surfaces onto the balsa stock.

The fuselage is cut from a piece of $\frac{1}{8}$" sheet. Round off the edges with a sharp knife or razor blade. Any irregularities that are left may be sanded smooth with a fine grade of sandpaper. Cut a vee on the top of the fuselage where the wing will rest. This affords a good joint between the wing and fuselage.

The wing is cut out of 1/16" sheet balsa, after which it is trimmed and sanded to the required airfoil section as depicted on the plans. Before putting in the dihedral, bevel inner both ends so that a firm joint may be formed at the center. Prop up the wings with small blocks and check to be certain that each tip has the required $1\frac{3}{4}$" dihedral. The tail surfaces are cut from a length of 1/32" sheet balsa.

When the wing has dried thoroughly, apply several coats of dope to all parts, sanding lightly between each coat, until you have achieved a satin finish.

A reasonable amount of care should be exercised when assembling the various parts. With the aid of pins, cement the wing and stabilizer in their respective positions, making certain that both are set at 0° incidence. Check to see that all parts are aligned properly and allow sufficient time to dry thoroughly.

Before test flying, attach some modeling clay to the nose until the fuselage balances in a horizontal position. This can readily be checked by holding the glider by its wing tips.

After a few test glides, you will be able to determine the model's natural reactions to the elements, and adjust your *Baby Glider* accordingly. When satisfactory hand-launched flights have been obtained, a hook may be attached approximately 2" from the nose. Using the slingshot method of launching, you can expect higher and longer flights to result.

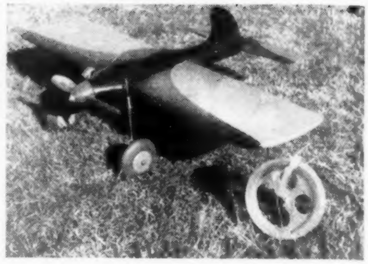
STORAGE REEL HANDLE

Have you ever noticed how much time you spend on the flying field reeling in or setting up your lines for flying? Every time someone else wants to fly, it means reeling up the lines, disconnecting them from the ship and practically "closing up shop," or taking the risk of having someone step on the lines and ruin them.

It appeared logical to use the same reel for a control handle that is normally employed to store the wire. The Pylon Brand controline reel was one that seemed to offer possibilities in this direction. There are four large holes die-cast in the web of the reel. If the web between any two is removed as shown in the picture, and the inside carefully filed smooth, the reel can be used as a handle as well. You can leave your lines safely reeled until it's your turn to fly; simply loosen the wingnut and reel out to the flying circle center and you're ready to go. It's just as simple to clear off the field to let someone else fly.

To make the conversion, hold the die-cast reel in a vise and hack-saw along the edge of the web. It's best to cut the web 1/8" back from the flanges, then file the rest off later to avoid going through the thin wall. Next cut the web through as close to the hub as possible, removing this section of web completely. File off all rough edges, smoothing the flange side of the hole to a curve formed by the flanges. Try your hand in the hole for size.

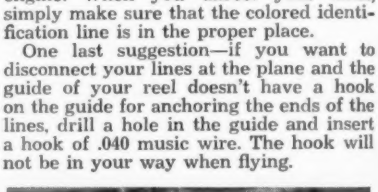
It is best to use stranded lead-in wire on the reel-handle, though small chain can also be used. For the stranded wire, simply drill three 1/16" holes about 3/8" apart, through the center of the flange in the middle of the hand hole (back of the reel-handle). To insert the wire so that it is adjustable, yet will not slip under the pull of the plane in flight, thread the wire through the center hole from the outside of the reel, back out through an outer hole, across to the other outside hole and then back out through the center hole. This gives you a figure-eight type lock that can't be pulled loose! To



adjust the lines, simply feed the wire back into the center hole and pull up the slack through the outer holes. Add your favorite end loops to the leads and you're ready for business.

The three holes are so close together at the back of the handle part of the reel that the lines will stay equal in length even when reeled. To reel up your lines, flip one lead over to the same side of the reel as the other lead was for flying, then loosen the wingnut on the handle-wire guide and reel in your lines. To hold the reel up snug against the wingtip of the plane, just tighten the wingnut again. The wire guide is an automatic indication of the up line when you run out to pick up the handle and fly, after starting the engine. When you unreel your lines, simply make sure that the colored identification line is in the proper place.

One last suggestion—if you want to disconnect your lines at the plane and the guide of your reel doesn't have a hook on the guide for anchoring the ends of the lines, drill a hole in the guide and insert a hook of .040 music wire. The hook will not be in your way when flying.



Scrap Box

(Continued from page 6)

down a la parachute, with the fluttering wing lowering the ship to safety.

Little love is lost between certain groups on the Coast and the speed boys from around Buffalo way. Bone of contention was a certain record. The Westerners said it couldn't be done. Now one guy from Buffalo retorts that there should be a motto reading: dictated by West Coast speed merchants, designed for blind obedience by all other modelers, heaven help those who beat our time. Oh, dear! As they say, East is East and West is West. But didn't they meet? Wish we could print all comments like this but we have too many dependents to take the risk. Perhaps we should add that said Westerners offered $50 for any Easterner who could come within ten miles of said record. Now both factions know that we didn't drop the papers in the open top filing cabinet. How about leaving the axe buried?

Ted Alexander, Dedham, Mass., has some evidence that British modelers may be better than their American cousins, at least in certain categories. On Sunday, May 15, the *Norwood Society of Model Engineers* ran off an exchange meet by mail with the *Leicester (England) Model Airplane Club.* No arguments (natch), nobody mad at the judges, timers, record keepers, other entrants, spectators, or even themselves. In other words, a real sporting event. But how did the contest work out? Well, the British were handicapped by bad weather and a bad field, the Americans by a high wind. The English won: *Gliders:* Paul Nichols, USA, 398 sec. on towline; Mrs. Joyce Stothers, GB, 277 sec.; *F.F. Gas:* Ken Stothers, GB, 545 sec.; P. A. Orleans, USA, 200 sec.; *Rubber:* Ken Stothers, GB, 188 sec.; Ed Heyn, USA, 141 sec.

"The International idea really is fun," says Ted. "We exchange kits, magazines, ideas—and real fine friendships have come out of it. We plan further meets this summer and have worked out a system whereby we tie-in our International meets with our scheduled meets around New England (and they, around England) by using our best times at local meets as a basis for judging. This makes it possible to accomplish an International meet on the same Sunday we might be flying with other clubs.

"We have only a small club compared to the English club, but we get along fine. I should be glad to give an idea how we work our International meets to prevent friction that might arise over motor runs, classes, etc. We have exchanged snapshots and this has helped everyone to know each other better."

This reminds us that a couple of years ago the *Cleveland Balsa Butchers* held an

(Turn to page 36)

NOW - 3 MORE E-Z "PREFAB" FLYING MODELS
ALL BALSA PARTS ACCURATELY DIE-CUT
EXACT SCALE! — FLIGHT ENGINEERED!
RUGGED, RIGID, YET FEATHER - LIGHT!
only 50c per kit
3 Other Amazing E-Z Kits
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MIDGET MUSTANG E-Z 118 16" only 50c
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18" span BRITISH WWI SE-5
America's Finest Models For Over 30 years
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20" span BEECHCRAFT BONANZA
MINNOW
PIPER CUB
LUSCOMBE SILVAIRE
STINSON VOYAGER
McDONNELL PHANTOM
ERCO ERCOUPE
AERONCA CHIEF
GLOBE SWIFT
GRUMMAN PANTHER
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PERFECTLY DESIGNED 3/4" SCALE "M" Master KITS
Cleveland's thirty years of scale model designing have produced "M" kits—low in price, but the world's finest at any price. Though fine enough to be prized for display alone, they are versatile — and can be flown free flight when powered by rubber or small glow plug and CO2 motors. They are also flown as control-line models, when "beefed up". Light, strong built up construction — complete materials except power units and liquids.
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LOCKHEED F-80 29¼" SHOOTING STAR $2.75
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JET FLYING BOAT

No, this is no roaring monster—it is a little plane driven by Jetex power . . . . . almost small and quiet enough to fly off your bathtub! You'll find this new design by Frank Ehling in our October issue.

exchange meet with a British club and the publicity was good for newspaper space. Any American clubs that might be interested in working up an exchange meet, adopting, as it were, a British club, will be interested in getting more info from Ted who resides at 185 Elm Street, Dedham, Mass. If interested club secretaries will write the *"Scrap Box,"* we shall volunteer our services in locating corresponding British clubs. Be sure to include dope on size of membership, types of ships of interest, and so on.

Joe Bligh, the chap from Atlantic City, who experimented with Benzol after another contributor's suggestion, tells us he decided to stick with methanol. By its formula C_6H_6, as compared with CH_3OH for methanol, Joe says that any chemist can tell you there is too much carbon residue. Joe has been going to school out in Spokane, Wash., where he hung up top jet time of 112.15 mph.

"When I flew the same plane *(Dyna-jet Squirt)* at Coulee Dam, I brought out the fire department, including the chief in person. The field was extremely dusty—that thick, powdery stuff—and the clouds of 'smoke' really rolled. The field was about a half mile downstream of the dam and, so help me, the echoes of the *Dynajet* kept bouncing around for 15 to 20 sec. after each flight. The field itself is hemmed in by tall, rocky mountains. My room mate, Ernie Cummings, former *Sky Blazers* treasurer, lost his grip on the handle of a *Contestor*-powered *Go-Devil*, and I lost my jet, so we can head back home without any worries!"

Joe thinks the British will set some real jet marks. J. M. Clark of the Jaggers Company in Britain, corresponding with Joe, states that 185 and 187 mph speeds have been attained and that 200 is not out of the question. Funny, when jets were first introduced several years ago a Navy guided missile man, and well known designer, calculated that 200 miles was theoretical limit for such models. Joe suggests that handles be taped to the contestants' hands in flying fast jets. Incidentally, there is a report from Anaconda, out Montana way, that 192 mph has been reached. Local spies say the power plant is an English *Juggernaut* that develops 4-3/4 lb. of thrust for 8-1/2 oz. weight. Don't they say that pounds thrust equals horsepower at 375 mph? All you have to do is whirl at 375 mph and you'll know what 4-3/4 hp feels like!

H. A. Thomas, Little Rock—and that reminds us that one of J. L. Sadler's *Little Rocket* designs that appeared in the British press took a first at their Nationals, and a South African dentist made a clean sweep in three places with a family of *Lil Rockets*—has an idea for an anti-spin device for free flight models. This gimmick is nothing more than a bellcrank, with a push rod connected to the rudder trim, and a weighted arm dangling below the other hole (slot rather than hole in this case). This arm is pivoted below the bellcrank so that, when centrifugal force causes the arm to deflect to the outside of the circle, the upper end of the arm, acting like a lever, moves the bellcrank, ruddering the ship to the outside of the turn. The Belgians have been using a somewhat similar, though simpler device, consisting of a wire arm projecting in front of the rudder, which is hinged. A lead weight is attached to the fore end of the arm. As used on their contest models, it causes the ship to climb straight ahead.

"Puzzling part of the whole thing," says Thomas, "is that, if the gadget works, it should prevent spins in first place—you'd never know for sure whether to credit basic airplane design or the gadget for lack of spins—assuming, of course, it didn't spin."

From Jim Walker comes news that Dallas Sherman, the man responsible for the Pan-American weight lifting idea, is interested in working the event into the Walker Flight-Plan contest. Sherman wasn't referring to still another event, but to the possibiilty of transferring rules over from the Free Fight type of category to Flight Plan, using the present weight carrying set-up. And wouldn't that be something . . . at the Los Angeles Hobby Show, Walker performed almost all maneuvers but the vertical eight on 20-foot lines with a lightweight .099 powered *Fireball*.

At Delta States meet George Trammell did a beautiful job with his radio-control model, performing Immelmans, loops, precise turns, eights, and spot landings. Then somebody kicked loose one of his cable plugs while the model was in a power spin and eliminated all control! Flying scale was won by a *Corsair* with clockwork retracting gear that folded up wheels—one before the other—just like a real ship. The gear rotates through 90° on the way up!

Frank Nekimken sends along latest American Legion literature. The Legion's Americanism Manual gives considerable space to their Model Airplane Program; the Post Handbook (if we recall correctly, there are over 16,000 posts) draws attention to the program. A folder outlines T-shirts, trophies, stop watches and other items which the individual posts can order to expedite their own programs. Space permits no further details now but it looks as if the Legion is moving right ahead after a slow start.

Gordon Greenley, (not the motto writer) Williamsville, N.Y.—where the *Speedwagons*, etc. hail from—is a man you'll love. "I also am running a model repair hospital," says Greenley, "for the boys who like to fly speed and stunt and can't find time to make repairs." This way, Nurse! Greenley sends along some excellent snaps of Goodyear type racers which the local boys seem to be developing rather intensely (oh, yes, that Schumacher man said to use removable "pilots" as in Pan-American event for semi-scale racers in order to govern realism and cross section). Greenley builds aircraft models, sail boats, motor boats, railroad cars, street cars, these last for Hensley's Hobby House, Kingston Ave., Buffalo. Among Greenley's suggestions:

"Whenever we run or direct a model meet, such as Plymouth Eliminations, we raffle off a complete airplane ready to fly and teach the winner to fly it the moment they win it. I designed an easy-to-build stunt job named *Greenley Caboose* and make up kits and furnish a set of prints. Members volunteer to build the ships, reimbursed for incidentals like landing gear. Last year, we had used engines of club members; this year purchased four *Bullets*. We hectograph 100 tickets at twenty-five cents each and the club nets approximately $18 per plane. Last year the club made $50 with *Cabooses*."

Before the caboose gets us, here is the story of the Class B free flight with a brain. Seven times it drifted off cross country, out-of-sight. What's remarkable about that? Hang around, brethren!

"On the first out of sight," says Fred Otten, *Screamin' Demons*, Long Island, "we chased it 12 miles, gave up, only to find that someone had returned it. The finder's brother was a model builder. The third time it landed in the Hackensack River (in North Jersey) and an obliging Cub pilot landed beside it and fished it out of the briny. He was an ex-modeler. The fourth time it landed on a man's front porch while he was reading the Sunday paper. His son was a model builder. On the fifth flight it landed in an open spot outside Newburgh, New York, and was picked up by a couple who happened to be on the wrong road. On another flight it was lost for six months outside Schenectady; someone out for a walk found it and brought back the stabilizer, leaving the rest to lean against a tree until the snow melts (presumably it has melted by now). If it is returned this time, I will be convinced it has a brain."

Well, Fred, that story is different enough to deserve the monthly award of a free subscription to MODEL AIRPLANE NEWS for the best tall true story.

Which reminds us of the time the farmer had us come out to pick up our *Rocket*-powered *Box Car*. He had run over it with the harrow, but his heart was in the right place!

Design Forum

(*Continued from page* 13)

as in Fig. 2.

The next step is to insure longitudinal stability, usually achieved by use of a horizontal tail surface or stabilizer. The stabilizing effect of this tail surface depends on two factors: first, its distance M from the main wing—second, its area. On one hand it is advantageous to keep the stabilizer moment arm M as short as possible to reduce fuselage weight; on the other hand, high speed models with short tail moment arms are more likely to be erratic. Through practice it has been found that usually M should have a value of 3-1/2 to 4 times the wing chord. The longer the moment arm the more effective the stabilizer will be with any given arrangement.

The area is also important. The stabilizer effect with a given moment arm and design, is proportional to the stabilizer area. If sufficient area is used, stalling in any model can be prevented. In some cases, stabilizer area as much as 50, 60, or 70% of the wing area is necessary to completely prevent stalling. In the average model, however, stalling may be overcome with a stabilizer area of 33% of the wing chord.

In the case of tractor gas and tractor rubber powered models, the length of the nose has a decided effect on longitudinal stability. If the nose is very long a comparatively small stabilizer will be ineffective. So, when using 33% of the wing area for the stabilizer, be sure to keep the nose length N comparatively short and no longer than 1/2 of M. This is simple in gas models. In rubber models, weight sometimes must be added to the nose; even extra weight is advisable if the nose cannot be shortened and yet retain proper balance.

The low center of gravity also improves longitudinal stability for the same reason that it adds to lateral stability, namely, through its pendulum effect. When the plane noses up, Fig. 3, the pull of gravity acting at C.G. moves forward relative to the lift L and tends to reduce the nosing up effect. The added lift on the stabilizer, due to the greater angle of attack during climb, also tends to reduce the nosing up effect. Through these means models are kept steady during climb and excess stalling is prevented.

Our next concern is fin area. There is a minimum amount of fin area that can be used for any given wing span. On rubber models this minimum is usually 12% of the wing area for spans that are double the moment arm length. If the moment arm is 24", the span may be then 48" with a 12% fin. If the span is greater, a larger fin should be used. In gas models the minimum fin area is 5%. If less fin area is used, you run into the danger of tail oscillation during flight. This may whip a plane into a spin, especially if the forward side area is high above the center of gravity. On the other hand, even though the fin may be a minimum required for the span it may be so large that during turns the plane sideslips and noses in. In such a case, you are up against a real problem because trouble results regardless of whether you change or do not change the area of the fin. If the fin is made smaller to reduce the nosing-in effect during a sideslip, the tail will have a tendency to swing or oscillate under the effect of forces acting along the wing span.

This nosing-in effect, however, is the key to the solution. It means that the C.L.A. is too far to the rear. Reducing the

fin size is only one way of bringing it forward. This may be accomplished also by increasing the lateral area forward of the C.L.A. through the use of a pylon to support the wing (Fig. 2) or, by means of a fin extending downward beneath the fuselage, as in Fig. 3, or both. The C.L.A. moves forward then from F_1 to point F without changing the fin area. So with this arrangement we have lateral stability, longitudinal stability and directional stability.

Now we come to the important factor of spiral stability which is influenced by both *the amount* of forward side area and its *position upward or downward,* relative to the center of gravity. If the amount of area is sufficient to bring the C.L.A. to a point which is 15% of the tail moment arm rearward of the center of gravity, the nose will not drop excessively when *sideslipping* during a turn. This means that the airplane will recover laterally before the nose drops and a dive results. However, to retain spiral stability when the airplane *skids at high speed,* the vertical disposition of the forward area and the C.L.A. is important. If only a pylon is added between the wing and fuselage, as indicated by the heavy line in Fig. 3, the C.L.A. will be located at point F1 so that when skidding, the side pressure will react *above* the center of gravity and flip the plane into a tight bank and probably into a spiral dive. If a fin is also added below the fuselage, the center of this forward area will be comparatively low with the resulting C.L.A. located at F on a horizontal line passing through the center of gravity. With the C.L.A. in this low position and 15% of the moment arm rearward of the center of gravity the airplane will be exceptionally stable and steady during all conditions of flight.

Planes with high C.L.A. often fly stably —*provided* they are *adjusted and flown so that no skidding results during flight.* High pylon models have been seen to go into tight spiral dives on many occasions when for some reason they started to skid at high speed. This was primarily due to the high C.L.A. With the fin shown in Fig. 3 and the C.L.A. low at F, stability will be assured whether the pylon model skids or not.

Some may say, why put the fin on if pylon models can be made to fly well? There is only one reason and that is, such models will fly more *consistently well* if the C.L.A. is low. This means that there is greater chance during a contest of making *three* consecutive flights of long duration. Also such models are more easily adjusted because no trick adjustments are required to obviate or overcome basic errors in design such as high C.L.A. positions.

If you lay out either your gas model or Wakefield job along these lines you will experience a greater number of winning flights and more general pleasure in flying. It will also result in many more hours of flight for any given airplane because there will be fewer crack-ups. Possibly, many model builders will not agree with this. Nevertheless, consider the following: at one of the great national contests the chief proponent of high pylon low thrust line construction was watching one of his models flying at about 300′. Unfortunately the model was adjusted so that it flew nearly level at very high speed instead of climbing. To the concern of all a side gust suddenly veered the model to the left with the result that it flipped quickly into a steep bank and nosed down into a tight spin from which it never recovered. In spite of this demonstration, this pylon expert claimed and is still claiming that the high C.L.A. which his model possesses did not and does not cause spiral dives. On that occasion it was perfectly obvious that the sudden skidding of the model was the result of swerving under the effects of the side gust, and that pressure well above the center of weight producing a rolling and diving couple between these two forces, resulted in the sudden tight spin. The only way that these facts can be verified and brought into their true light is by actual practice. If your plane is laid out as described above you cannot help but recognize the virtue of this arrangement of design features after flying your plane.

Mr. Keith Gardner who is interested in Wakefield models also wishes to know what constitutes a tail plane. Is it a stabilizer, rudder or both? A tail plane, as stated in the Wakefield rules, can only be interpreted as a horizontal surface. A vertical surface is called a fin. When a V tail is used, as illustrated in Fig. 4, the tail plane area is assumed to be the *effective horizontal surface* which in this case is the horizontal projection of the V tail. Its "area" is the span S times the chord or width of the tail. The fin area contributed by the V tail is the vertical projection F times the width or chord of the tail.

Mr. Robert Siegel, of 950 East 79th Street, Bronx 60, N.Y., wishes to know of a foolproof method for determining whether or not an engine is aligned properly in a plane, without the thrust line being turned at an angle with the plane's normal longitudinal axis. The alignment can be determined quite simply as indicated in Fig. 5. First turn the propeller into a horizontal position. Then

(*Turn to page* 52)

Model "Characters"

(*Continued from page 27*)

fellow, he carries a well-made wooden case. In a twinkle the case is open and three tiny models are assembled. Up into the blue zooms No. 1, and as a stooge chases it, the *Midget Builder* is already busy flipping the prop of the second neat little ship. Although one of the earliest to leave the field, we find that the *Midget Builder* has made the greatest number of flights (without denting a prop), has acknowledged the salutations of all the "big wheels," and has scooted home to prepare his latest design for publication in MODEL AIRPLANE NEWS.

Meanwhile, we have been neglecting a young man who always manages to get in a lot of model flying time, although it is often difficult to understand just how he manages to get his dilapidated crates into the air. This fellow is of large, rotund proportions, with his clothing plastered greasily to his bulging limbs. He is the *Horrible Mess Builder.* Though his models rarely have a severe crack-up, they are a mass of tattered, oil-soaked paper, and dirty exposed balsa. He brings about this condition by poking his fingers into the covering, as he hastens to toss a ship skyward before the sputtering engine conks out. Watch out for this fellow!

No. 5 on our list is the *Builder-With-His-Girl.* This fellow seeks to add the spice of female applause to the other pleasures of model building and flying. The girl is usually a trim young thing who looks very attractive in her sports slacks, and our Romeo spends most of the time trying to explain the science of modeling to her. The rest of the time he spends making excuses for the poor performance of his ship which refuses to respond properly.

Swooosh! Don't be alarmed! That was just a hand-launched glider swishing under your nose. There are usually several *Glider Builders* on the field at once, and at any instant a flash of polished balsa may be seen streaking up into the sky. Since every glider flight is exactly the same as the next, the spectator soon loses interest in them. However, if out of the corner of your eye you glimpse a person who suddenly "winds-up" like a big league pitcher and heaves his arm as if to fling it across the field; duck! . . . gliders have pointed noses.

Never forgetting the glider peril, let us stroll over to the far end of the field and take a look at the *Speed Demon.* To the uninitiated this fellow might seem to be having a tug-of-war with a whirlwind, but we know differently. Personally I can't understand the *Speed Demon.* Is he a frustrated chap whose goal in life is not to do things better and better, but to do them more and more? It is true that speed modeling requires a high degree of building and flying skill, but to what avail? I can see no beauty in speed, it is a matter of quantity rather than of quality. The model goes faster and faster with the result that you see it less and less. Many aerodynamic qualities which do not contribute to the attainment of speed are neglected, as in the days of rubber powered speed ships when a winning model often crossed the finish line *flying upside down.* Oh well, let us just say that the *Speed Demon,* like the *Monster Builder,* is a specialist, and all the advantages and disadvantages of specialization must be taken into consideration.

But who is that thin, grouchy fellow who keeps chasing the kids away from the models with a gruff, "Stand back, you little —."? Yes, it's the *Nervous Builder,*

and he has troubles. After catching his finger in the prop, changing two sets of batteries, and dismantling the engine timer assembly, he finally gets the engine to run—only to discover that he has left the tail assembly at home. He now packs up his kit and, secretly relieved, becomes quite pleasant to everyone. He ambles over to aid the *Calm Builder.*

Did I say *Calm Builder?* Excuse me please, for there is no such creature. However, we are sometimes privileged to behold that illustrious person, the *Expert's Expert.* Few of us ever get to know the *Expert's Expert* personally. Somehow one simply does not go up to such a man and say, "Did you design that ship yourself, Mack?" Usually he flies his super-dooper gas-buggies from within a protecting ring of ordinary experts. I once came to know an ordinary expert quite well, and perhaps if we had maintained our friendship he would eventually have introduced me to an *Expert's Expert.* Unfortunately, I was drafted into the Army before this came to pass.

And so, as the last model drones over the rim of the setting sun, we leave our Model Field Characters — interesting "characters" who make up the creative, progressive body of model airplane enthusiasts of which the nation can well be proud.

Rebuild It?

(Continued from page 29)

worn out pistons can be made to perk a few hours more if the needle valve body orifices are opened up slightly, the plug gap increased, the coil input upped to 4-1/2 volts and a fuel composed of 50-50 naptha and S.A.E. 90 oil used.

Before leaving the subject of fuel, we wish to caution readers who may try the naptha formula to make certain that what they get is naptha or benzine, not benzene or benzol which is sometimes confused with it. The slight difference in spelling makes all the difference in the world as far as performance is concerned.

We think it would be interesting to hold model airplane "hot rod" contests using motors personally souped up by the entrants. A minimum of reworking should be specified and since such contests would be to find out whose reworking was the most successful (not who started their rework with the hottest motor), it would be equally fair to specify fixed landing gear and electric ignition (except for diesels) for everybody, with the allowable engines to be determined not necessarily by age, but by a formula taking into account rated factory hp, area of the ports and type of induction. To further simplify matters, all classes could be lumped together under a sliding scale based on current AMA records, the displacement of the engine determining its "earned speed."

Well, why not dig out that old junk and give it a whirl? The worst you could have when you get through with it is junk, and that's all it is now. With a bit of care and luck you may make a hot piece of iron out of it.

PHOTO CREDITS

Page		
8		Bill Noonan
11	All	Cloyd Teter
21	Upper, Lower	Northrop Aircraft
	Center	Acme
23	All	Raymond Studios
28, 29	All	Harold Fowler
49, 50		New York Daily Mirror
54		Acme

Mayfly

(*Continued from page* 11)

might logically be found on the actual airplane, were it in existence. The wing structure, controls and landing gear, for example, are shown in a form adapted to scale model representation. A "molded monocoque" type of fuselage construction was envisioned for the full size design. This construction, developed by several airplane companies during the war, molds plastics or plywood to any desired fuselage shape. A suitable scale model substitution for this construction can be obtained by "planking" over formers, by hollowing a solid wood block carved accurately to the external shape, or by molding plastic sheet over solid wood fuselage forms. The last method was used in the construction of the engine cowling and the sliding hatch. (See "*Material Matters*", April, 1949, *M.A.N.* for details of this construction.) The fuselage on the original *Mayfly* is 1/20" spruce planked over plywood formers. The wings feature the structure shown in the drawings, with a sheet spruce 1/64" covering on all wing leading edges and tips. The trailing edges of all surfaces were formed from brass tubing shaped to triangular section. The lower wing center section is built integral with the fuselage, the fuselage sections D and E extending outward throughout the lower wing stubs to form the front and rear spars. In general the framework of the original *Mayfly* is of orthodox scale model construction built to the scale of one inch to one foot.

The landing gear arrangement is in some respects unusual and may be adapted to a variety of scale designs. Its principal feature is a wheel tread of 30% of the span—an unusually high figure for small airplanes. The retracting mechanism utilizes a helix—it operates on the same principle as many mechanical pencils. This principle is suitable for manually operated full size systems in small airplanes, if a locking device—possibly a spring loaded steel pin projecting into the extended shock strut—is employed to prevent the retracting mechanism from undergoing any landing loads. In every type of retracting gear, the operating mechanism is stressed only for raising or lowering the gear, and not for any loads imposed on the gear itself. The model system has proved rigid in every position from fully retracted to fully extended and does not require a locking arrangement.

In case the drawings prove complex, here is a brief description of the retracting apparatus: the actuating wheel is mounted immediately ahead of the dash. This position was selected, not for convenience, but because it permits the most direct and least complicated arrangement—accepted practice in the interest of reliability. Rotation of the retracting wheel revolves, through two bevel gears, the helix within the slotted tube. As the helix is revolved the "key" is raised or lowered and, since the retracting struts are pinned by means of the "rider" to the "key," the gear itself is raised or extended. The shape of the struts is determined by the space available for them in the retracted position. Similarly, the attachment of these struts to the shock struts at a point to the rear of the shock struts is required to permit the retracted struts to fit within the lower wing stubs' leading edges. The covers which fair the landing gear, when retracted, into the fuselage and lower wing structure are two separate pieces, one of which is attached to the shock strut, the other to the landing gear leg. The wheel cover slides over the shock strut cover during shock absorbing action. The shaft hinging the shock struts to the lower wing stubs is pinned to the front spar by a fitting, which on the actual airplane would be a steel or dural casting. This was modeled on the miniature by shaping and drilling a section of brass stock. Modifications of this retracting arrangement may be suitable for other scale designs of various types. Cheap mechanical pencils are a potential source of ready-made helices of different lengths, sizes and designs.

The *Mayfly's* control system is conventional with the exception of use of rudder rods and sliding rudder pedals instead of cables and a hinged pedal arrangement. The forward travel of the pedals makes use of the floor space between the retracting tube assembly and the retracting struts. If the cockpit controls are attached to the floorboard outside of the model and the whole unit then installed, the aileron, elevator, and rudder rods will not prove difficult to connect. This of course must be done before the fuselage construction is very far advanced. It will be noted that neither a trim tab nor adjustable stabilizer has been provided. Small single place airplanes are not subject to variation in weight distribution to the extent of larger machines and, when rigged properly for powered flight, have little nose heaviness in the glide.

In all scale model work the finish is of extreme importance. Silk is the ideal model equivalent of aircraft fabric and on the *Mayfly* the entire structure with the exception of the engine cowling is silk covered. For best results each part—center section, rudder, stabilizer, a wing panel, etc.—must be covered and finished separately. If the model is built to be assembled and disassembled in the same manner as the full size airplane, maintenance and storage problems are simplified. On the *Mayfly* the finish included six coats of clear dope, four of aluminum dope, and two of enamel. Not more than two coats of dope should be applied without sanding. A No. 400 Wetordry paper is appropriate for the first few sandings; No. 600 is suitable for the final operations. A higher luster can be obtained with the better enamels than with pigmented dope, and since dope cannot be applied over enamel, it is important that the desired finish be attained before any enamel is used. The finish depends primarily on the smoothness of the surface before enameling and it takes a minimum of eight coats of dope with appropriate sandings before a silk cover will acquire the necessary smoothness. The enameled surface when thoroughly dry can be worked with No. 600 sandpaper, rubbing compound and wax. All of this takes time, but only a small proportion of the total hours spent on a scale model. A model finish of the type suggested will bear a remarkable similarity to the better finishes found in the aircraft industry's fabric work.

Original exhibition models are an interesting variant in the scale field. Although some knowledge of airplane construction and design is required, a fact worth remembering is that the appearance and arrangement of many successful airplanes has been the work of individuals familiar with airplanes but unqualified as aeronautical engineers. A detailed scale model remains one of the best ways for the amateur designer to try out his ideas for some particular airplane type.

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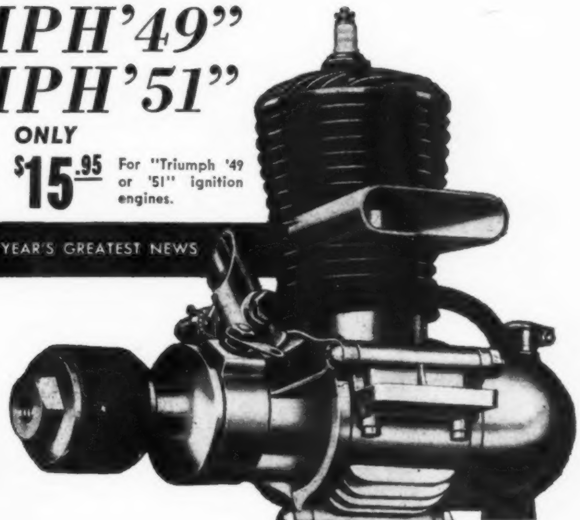

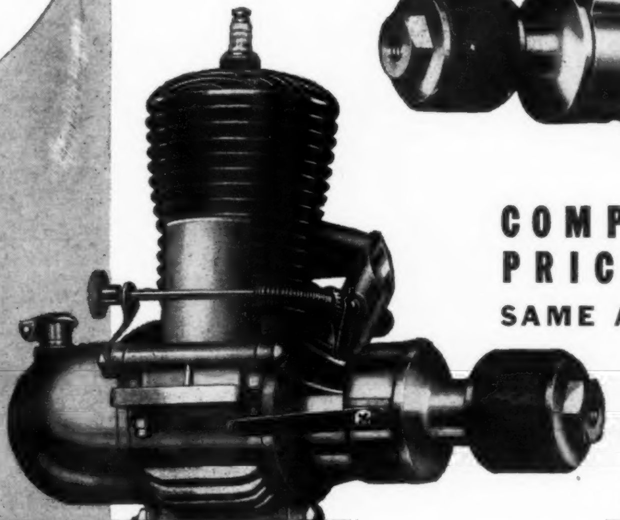

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CIVY BOY

Paul Gilliam's famed Civy Boy series has now appeared in every possible size and class. We feature in our October issue the Civy Boy 74, a Class C job which has won an astonishing number of contest places. Watch for plans of this outstanding design . . . on the stands September 8.

Little Swoosh

(*Continued from page 23*)

a stall. For the first power flights cut a fuel charge in half as this will give reduced power and a short run. The reaction of the model in powered flight can be checked and when the flight is okay, load up a full charge and watch her push herself up to a good altitude, then settle into a long flat glide.

The plans on page 22 are full size for a model powered by the *Jetex 50*. A ship made to just double this size will prove ideal for the *Jetex 100* power unit.

Northrop X-47

(*Continued from page 21*)

and return to the same speed with which it started, or we would have huge "holes" in the sky surrounded by fiercely turbulent air. Thus, after speeding the air up to supersonic speed over the forward portion of the airfoil, we must slow it down over the aft portion and, as described above, this creates expansion, which is a shock wave. This violent expansion occurs so rapidly and with such force that it creates a "surface of discontinuity" in the air, a narrow line on one side of which the air is at supersonic speed and on the other side subsonic! Yet this occurs in such a short time and distance as to be considered instantaneous and dimensionless!

But right at the surface of the airfoil the air is not moving at all! (Dust on the X-1 wing at take-off is still there after landing—believe it or not!) A few millionths of an inch out the air is moving slowly. A few more millionths of an inch it is moving more rapidly and, eventually, reaches the supersonic speed of the flow one-half to one inch out. This "boundary layer" thus acts to retard the flow over the wing and thereby creates friction drag. As the shock wave penetrates into this boundary layer, due to its violence and force, it transforms these smooth, "laminar" layers into intermingled layers that are "turbulent." This turbulent air streaming off the trailing edge of the wing changes the "angle of downwash" hitting the tail and, therefore, interrupts the trim of the airplane.

Thus, we see that the formation of a shock wave on an airplane wing immediately creates stability changes that vary in type, severity and sequence of action. Since these shock waves form at 760 mph over the thickest part of the wing, they can occur when the airplane itself is traveling at only 650 mph in the case of postwar, thin-wing designs, but as low as 350 mph in the case of prewar "thick-wing" designs. Since 650 mph is about 85% of the speed of sound, this is the beginning of the transonic zone for the latest jet fighters. After all of the flow over the wing becomes supersonic, the expansion takes place far behind the airplane (several hundred yards at high supersonic speed), and no stability difficulties exist. This condition occurs at about 115% of the speed of sound, or around 1000 mph.

Thus, the real problem for the aeronautical scientist in connection with high speed flight is the entry of shock waves into the boundary layer, which renders it turbulent, which changes the downwash angle on the tail, which changes the trim of the airplane, which changes the control forces against the hand and feet of the pilot! (A chain-reaction comparable in complexity with that of atomic

fission!) So, in essence, it is control forces at transonic speed that comprise the "sonic barrier" about which so much nonsense has been written.

Unfortunately, the wind tunnel is useless in providing information on control forces at transonic speed since Mach No. 1 (exactly) cannot be maintained by present tunnels across the test model. (We say "present" tunnels because there are some interesting new tunnel designs now being developed that may solve this problem some day in the future.) A shock wave is formed across the narrowest part of the wind tunnel and this is always across the model, since its presence in the throat creates the most restricted passageway for the flow. This shock wave bounces off the model, carroms off the wall and comes back to the model, resulting in disruption of the delicate test apparatus and the production of completely erroneous readings. And yet it is in the near-vicinity of Mach No. 1 that data is desperately desired!

There was only one solution to this problem: build an airplane, fly it in the near-vicinity of Mach No. 1, and measure the actual control forces produced! But hadn't the X-1 already passed through the speed of sound and on into sonic speed! Yes—but that was just what was wrong: it passed through so quickly on its way to supersonic speed that ample, reliable data could not be obtained! The answer: build an airplane that flies steadily and for long period right in this zone so that accurate measurements can be taken as long as desired. And that is precisely the purpose and the significance of the Northrop X-4, our Plane of the Month. And perhaps now you can see why we say that in the final analysis research scientists may learn far more from this "slow" airplane than the super-fast, historic, but supersonic X-1!

The Northrop X-4 is a small airplane with a span of only 25' and a length of only 20'. It weighs a mere 7000 lb., or only about one-half that of the X-1. It is small because its only job is to carry a pilot and about 500 lb. of research instruments. It is small, too, because it uses conventional turbojet engine power instead of the fuel-eating rocket engine of the X-1. Two Westinghouse 19XB turbojet engines were chosen because the airplane must fly for much longer periods than the 2-1/2 min. at full throttle of the X-1. The engines are small, the smallest turbojet engine in production, because the airplane is small and lightweight.

Because transonic fighters will feature swept wings, the Air Force included this feature in the X-4 so that the transonic research data obtained will be directly applicable for new design purposes. And because Northrop firmly believes that aircraft need no horizontal tail surfaces (and no vertical surfaces either when everything is fully enclosed in the wing), Northrop engineers wanted to test out their "tailless" theories for transonic speed. So the Northrop X-4 will fill three purposes in one: steady transonic speed, wing sweep and tailless configuration research.

Because the loads on aircraft undergoing shock waves are extremely high, one of the first requirements was that the new research airplane be very, very strong. The trim X-4 can sustain loads of 18g, which are believed by most scientists to be well beyond those experienced by aircraft in the transonic zone. To attain high subsonic speed with only two 3000-lb. thrust engines, the wing of the X-4 had to be thin, and it has a thickness of only eight percent of the chord. And lastly, its control surfaces had to be exceptionally strong to take the forces the air will exert on them.

The basic design of the X-4 was completed by Northrop engineers and submitted to the Air Force in May, 1946, more than a year before the historic first supersonic flight, indicating an early appreciation of the need for piloted, sustained flight in the transonic zone. The Air Force approved the design and detailed engineering got under way in June, 1946. More than two years were required to fashion the special parts, obtain the special materials and assemble the new airplane and it was not completed until September, 1948. After engine ground tests, the tiny plane was taken from its Hawthorne, Calif., birthplace by truck under heavy wraps to Muroc Air Force Base, Calif. After extensive ground and taxi tests, it raced across the desert lake bed and soared aloft for the first time December 15, 1948. With test pilot Charles Tucker (former National Air Races pilot) at the controls, the gleaming white research plane (to distinguish it in the air from the orange X-1 and the red Douglas D-558) remained aloft for 18 min. for a successful flight.

The X-4 has been flown considerably since then but the data on control forces at steady transonic speed are carefully-guarded Air Force secrets, for they are the *only* secrets of supersonic flight that the Russians *don't* have!

Look for JUPITER

A new ship by an old designer, *Jupiter* by Jamieson will be our Plane of the Month for October.

Off the Beaten Track

(*Continued from page* 15)

jet will go on pushing. Already at good altitude and high speed due to the prop, the jet could do a good job. Imagine that *Fireball* buzzing by overhead with hissing jet, prop standing still just like the real thing.

Radio control will go to town one of these days. And, when it does, what is likely to happen? Awkward ships that now teach us to fly, will give way, for the skilled, to more specially designed jobs as we learn the answers. Such models will grow smaller, faster, more maneuverable. If you don't mind cost of short-lived batteries, you can make an R.C. plane now for an .045. Perhaps it is possible to make a Goodyear type on an .099, certainly for a .199. The machine would have to be lightly loaded enough to permit a hand launch and a reasonable glide. Knock off wings, tail, and nose could be designed. "Applecheck" cowls could have a protective plywood backbone. Flaps could reduce the glide speed. It would be a trick, true, to develop flaps that would not upset trim.

On many real planes, putting down the flaps tilts the nose down for a steep glide path. Suppose that the thrust line was so located that normal flight was performed with a nose-down moment. When the prop stops, such a model will nose up. But, if the flaps go down at the same time, canceling out this nose-up tendency, it might be possible to go merrily on gliding. Much depends on whether the plane is a high, shoulder, or low wing. Or, if flaps have a different trim, it should be possible to hand glide with and without flaps to determine the stabilizer setting in each case. Then, by connecting the motor mounting and the stabilizer so that the disappearance of thrust immediately sets the stab in the flaps-glide position, flaps coming down automatically at the same time, the airplane could assume a reasonable glide. Flaps, of course, would work on many types of models besides "radio control."

Fowler flaps for free flight appear to hold advantages. A pair of big flaps sliding back when the ship begins to glide would have the affect of increasing wing area and boosting the L/D of the ship. Fowler flaps would permit designing smaller wings for better climb. Right now we have a choice between designing for climb, glide, or for a compromise. Fowler flaps would permit us to have our cake and eat it too. There's an M.A.C.A. study which shows that a moderately hooked trailing edge section increases lift more than it does drag, creating a higher L/D. Perhaps you have noted the affects of an accidentally hooked or warped trailing edge on the glide. Probably undesirable for power flight, this hook does show the possibilities of flaps that would extend for more area, dropping just slightly to affect camber after the manner of the report.

While on the subject of glide, there's much that can be done with gliders. In halls and gyms high-start endurance contests could be held with extremely small, lightly built soarers. Three- to six-inch spans with strict limitations on the power of the high-start line would produce some nip and tuck competition. No glider should reach the ceiling on launch. Problems? Fun? There still would be the same old headache of adjusting for turn without cracking up on the tow. Since these cannot be hand launched, it won't be possible to throw the glider against the adjustments to get that S-type flight. On the other hand, if you don't set the rudder you will glide into a wall. Getting those circles will puzzle the brainy boys, particularly on three-inch gliders!

Free flight stunting would be a flying circus. Up to now the size of the ship discouraged stunting, although many ideas were demonstrated in novelty events. With small engines like the *Anderson, Baby Spitfire, the O.K. Cub*, and so on, stunting could be tried without the fox holes. Loops would be easy. Jim Walker now has a ready-to-fly R.O.G. with a rubber-operated timer that pulls a metal slide to change tail incidence to produce a dive and a loop. Let's take it from there. Various timer and cam operated devices might produce other stunts up to rolls.

If it isn't the type of flying that gets you down, then it is the perpetual sameness of design. Why not develop some new pet layout, like a pusher or canard in free flight, or a wing in controline. Many outstanding successes have resulted from such thinking, so don't figure it a waste of time. Mather's canards in rubber, climbed high and glided well. Ed Lidgard's standard wing-first, but tail prop, was a rubber contest model with exceptional climb. Such ships give equivalent climb, on less power, can be lighter. Hank Coles wings have proved out in free flight, CO_2, and controline. He uses cambered polyhedral tips for directional stability. Tex Russell's swept-forward wing placed high at the Nationals in control speed. His ships were things of beauty, and performance too.

The model world is full of things to be explored. No one knows such a fundamental thing as the best layout for a free flight model. Such basic problems should have been researched long ago. Why not run a series of tests with profile CO_2 models to determine wing positions, angles, thrust lines, tail area, moment arms, and the rest of it? The same procedure can be applied to most any type of model. The only thing that cannot be made to fly better is a solid model and many of them have flown under the guise of controline.

If you let imagination run riot, you think of stunts like Gordon Light's proposed Trans-Atlantic model. We can't tie that but has any one tried aerial refueling with two U-control models? There are all manner of off the beaten track ideas, from the sublime to the ridiculous, from helicopters and ornithopters to flying wings. Ed Lorenz tells of an Englishman, now over here, who is putting radio control into a Wakefield sized model. Yes, the power is rubber. One of our pet paper projects is a 48" Nieuport 17, rubber powered and for radio control. The engine can't fail, nor can the model fly out of sight. With a big enough winder it should have reasonable duration. From experience with such models before (without radio), spanning up to 7' for a Cessna, we know realistic performance can be had. Night flying for U-control is fun, they say, with landing lights, cabin lights, navigation lights—and make that tail light flash! Powered sailplanes with baby engines for 6 to 7' spans would gain but 75-100' of altitude on their engine run but would glide like birds. Who wouldn't like to watch a really l-o-o-o-ng free flight without losing the airplane? Sturdy 100 mph slingshot gliders could be tried in open areas.

Now here's a real killer-diller—oh, oh, gotta stop fellows, here comes the keeper!

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All models are furnished with rubber for power or they can be engine powered with CO-2 Campus "Bee" or "A-100" or similar small engines.

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Airways

(*Continued from page* 31)

appearing in picture 3 is the work of Richard M. Tichenor (4101 Oriole Drive, Nashville 4, Tennessee). The model is powered by two *Super Cyclone* engines, has a wingspan of 62", and weighs 8-1/4 lb. It has been clocked at 73 mph. Was entered in six contests and took *first place* in every one! Though the model is rather heavy, it is extremely realistic in flight. A spring-loaded front shock strut enables the model to take off and land just like the real thing. Mr. Tichenor notes that he has had no torque troubles at all with the two-engine arrangement. Although an *Austin* timer is connected to cut both ignition circuits simultaneously, he finds it unnecessary to synchronize the speed of the two engines as it doesn't make any difference which one is running faster.

The butterfly tail speedster in photo 4 is the work of Al Baird (Lyndonville, New York) and is powered by a *Hornet*. The model, a *Speedwagon*, is painted jet black and has caused quite a bit of comment because of the really super finish. Mr. Baird is a veteran of some 20 years' model building and notes that he still gets a big kick out of MODEL AIRPLANE NEWS.

A large towline glider is the subject of No. 5. The model was built in the Netherlands by Mr. F. de Wolf (1st Oosterkade 7, Sneek, Netherlands) and has proven to be a good flier even though it is much too heavy. The entire framework is of hard wood, only the wing ribs being of balsa. Paper covering is used with white wings and red fuselage, the standard colors scheme for Mr. de Wolf's model plane club. This club, incidentally, is the *Sneker Luchtvaart Club*, located at Sneek, a town of some 19,000 people in the Northern part of the Netherlands. Although they are in farming country, the club members have a great deal of difficulty in finding suitable flying areas, since most of the land is cultivated and there are also many lakes around. This club was founded in 1939 and now has 16 members.

Although the *Bonanza* in photo 6 appears to be coming in for a landing, the builder, Vernon Vosburg (Thompson Road, Webster, Massachusetts), assures us that it is just a bit of trick photography. This plane, made from a Cleveland M kit, has a wingspan of 25-1/4" and took Vernon about three weeks to complete. The model is rubber powered, but the builder states that he does not intend to fly it as he has put too much time and work into it to risk a smash-up.

Another scale job appears in No. 7, this time a copy of *Mr. Mulligan*. The builder, Edward A. Varca (357 West Forty-sixth Street, New York 19, N. Y.), employed a little trickery to reduce his small son to the comparative size of the airplane. The model has a 32" span and is powered with an *Ohlsson 23* engine. Home-made exhaust pipe is fitted.

And still another scale model, the D. H. 71, built by A. V. Coles (24 Baron Road, Penarth, Glamorgan, England) is shown in picture 8. This airplane, which is named the *Tiger Moth*, is powered by an *Elfin* 1.8 cc. diesel. The model weighs only 10 oz. and spans 22". It is capable of a comfortable 65 mph despite the built-in headwind due to a complete set of bracing wires. Mr. Coles feels that this design would be ideal for Team Racing if increased up to a scale of 1-1/2" to the foot, since this would provide a wing area of 140" and sufficient room to cowl the average .29 racing motor. The model in our photograph is built to 1" = 1' scale and despite its small size, it has proven to be a fair stunt ship, turning in loops, horizontal eights, and even inverted flight. Mr. Coles notes that his club, the *Bristol Aeroplane Company Aces*, have taken up scale model building in a big way, and his D. H. 71 is one result of this program.

From the Philippines, we received picture 9, showing Benjamin C. Rivera (Welfareville, Mandaluyong, Rizal, Philippines) with one of the many successful models he has built from plans in M. A. N. The one shown here is Ray Beaumont's *Thermal Chaser*, but Ben has also had fine success with Bob Horak's *Wanderer* and Bruce Lester's *Atom Smasher*.

Another type of *Tiger Moth* appears in picture No. 10. This ship was also a D. H. design, and the exact scale model shown was built by J. S. Luck (99 Hill Street, Kingston, Ontario, Canada). This airplane has a wing area of 8.6 sq. ft. and is powered by a *Foster 29*. The model was originally inspired by Leo Pelland and is now owned by him. This one-fifth scale plane weighs 86 oz. complete with R. C. equipment and has an approximate flying speed of 20' per sec. The radio equipment is by Aerotrol and many fine radio flights have been had.

The Wakefield builders are represented this month by photo 11, which shows Clarence Mather's plane, *King Size*. It was designed to be a reliable flier in all sorts of weather and has turned in some fine contest performances, including second place at the 1948 Plymouth Meet. Mr. Mather (North Central College, Naperville, Illinois) equipped *King Size* with a two-wheel landing gear to afford smooth take-offs.

Our last picture shows an attractive free flight diesel model built by Albert E. Hatfull (42 Sandal Road, Edmonton, London, N. 18, England), which is powered

Lou Barbetta of Grumman Aircraft presents *Model Airplane News Trophy* to Fran McElwee for winning Radio Control Event at Mirror Flying Fair. Fran won same trophy for same event last year!

by an *Amco* .87. The 35" span model has a total weight of 6-1/2 oz. It has proved to be very stable in flight. Mr. Hatfull notes that the checkered flag decal over the wheel was "by courtesy of *Duro-matic*."

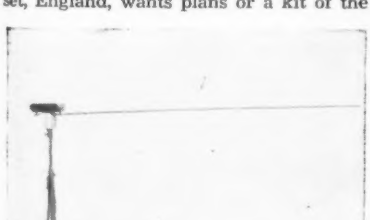
NEWS OF MODELERS

PEN-PAL SEEKERS: G. R. Bennett, 73 Boldrewood Street, Canberra City, A. C. T. S. 4, Australia . . . Roy Blackshaw, 31A Mount Vernon Road, Barnsley, Yorks, England . . . Floyd Carter, 9632 San Vincente, South Gate, California . . . Terrence E. Dodd, 36 Ventnor Gardens, Barking, Essex, England . . .

EXCHANGE MOTORS: L. Findley, 14 George Street, Barwell, Leicester, England . . . Jan Thylen, Nya Tanneforsvagen 56, Linkoping, Sweden . . .

EXCHANGE MAGAZINES, PLANS, ETC.: Walter Siegmann, 242 Hanburg 11, Wolfgangsweg 5a, British Zone, Germany . . . Lloyd Edwards, 32 Formley Avenue, Pt. Chevalier, W. 3, Auckland, New Zealand . . . N. Tinker, One Hider Street, Warrnambool, Victoria, Australia . . . G. Reeve, 105 Stokesley Crescent, Billingham-on-Tees, Co. Durham, England . . . Vincent Freedman, 11 Canning Place, Kensington, London, W. 8, England . . .

SPECIAL REQUESTS: Robert Kaplan, 138 South Hamilton Street, Poughkeepsie, New York, would like to dispose of his seven years' collection of MODEL AIRPLANE NEWS, dating from September, 1941, to September, 1948 . . . J. T. Sayers, Three West Street, Ilchester, Nr. Yeovil, Somerset, England, wants plans or a kit of the



Pylon used at Mirror Meet assured accurate timing. Upright rod on long arm was turned by controlines: switch in box under arm rest accuated stop watch in case at right

Stinson *Reliant*, 60" or 82" span, and will gladly exchange plan(s) or engine(s) for same.

Club News

California

The 8th Annual Model Industry Association Trade Show and Convention was held at San Francisco from June 13 to 17. Reports indicate that those for whom the show was mainly intended, the model dealers of the country, were conspicuous by their absence. Quite a few new kits and other model items were on view and news of these will shortly be appearing in the advertising columns of this magazine.

Illinois

The *Illinois-Iowa Aeronautical Association* held a successful Second Annual Free Flight Contest at the Cedar Rapids Municipal Airport. The *Iowa City Gas Hawks* earned the largest number of points and won the IIAA's free flight trophy for the second time, although the *Galesburg Model Airplane Club* had eight ribbons to the Gas Hawks' seven but lacked three points of taking the trophy. Thanks to the *Association's* Secretary Lawrence H. Conover for this information.

Minnesota

Ambitious Walter Davey, of the Range Hobby Center, Virginia, has organized a new club, the *Arrowhead Aeronuts.* Present membership is 20, and meetings are held every Wednesday evening. Major interest of the members is U-control. Richard Ahlfors was elected club secretary-treasurer, Ed Askew is the mechanics instructor, and George Silda is their flight leader.

New Jersey

Ronald Denk, secretary of the *Union Model Airplane Club*, tells us that the club's First Annual Controline Contest was strictly an inter-club affair and 23 members participated. The *Senior* winner was Ronald Denk and Ronald Stahl was *Junior* winner.

Pennsylvania

The latest addition to the *Model Wings'* units is the one located in Burgettstown. Through the efforts of the officers of *Model Wings* and two prominent businessmen, Mr. Charlier and Mr. Culley, this model club is being established at The American Legion Post in Burgettstown. This is of special importance to the organization as the new unit is located within three miles of the Hillman's Model Wings Airport. Mr. James G. Shenck, Publicity Director, suggests that any modeler who lives in that area contact Mr. Wayne Culley in Burgettstown for additional information.

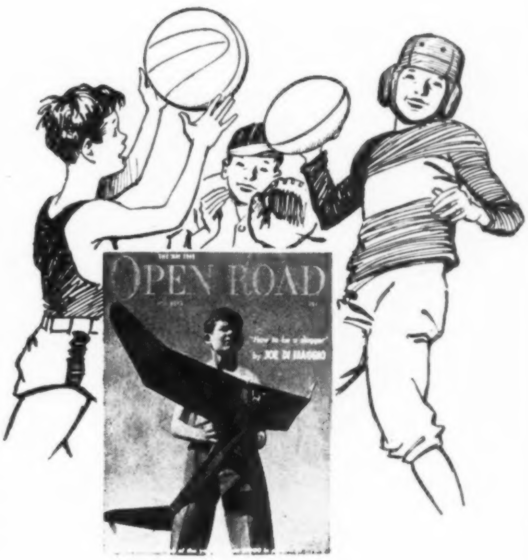
Hawaii

Brigadier General Robert F. Travis, Commanding General of the Pacific Air Command, took top honors in the Model Plane Contest sponsored by the Pearl Harbor Post 24 of The American Legion and the U. S. Air Force, at Hickam Field. More than 200 contestants, representing (*Turn to page* 52)

Air view of Mirror Model Flying Fair, Bethage, L.I., June 6. Cleared area in foreground for tall flight and radio control

THERE'S ACTION IN THE NEW

OPEN ROAD FOR Boys



Joe Di Maggio— Connie Mack—

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Design Forum

(*Continued from page 39*)

measure the distances A1 and A2, of each propeller tip from the tail of your airplane, making certain beforehand, however, that the fuselage is perfectly straight and that the prop is true on its shaft. If these two distances are exactly equal, then turn the propeller through 180° and measure the distances again. If both distances are still EQUAL, both the propeller and motor are in alignment.

However, if after turning the propeller 180° the distances are *unequal* to each other, it means that the propeller is not perpendicular to the shaft and should be remounted, so that regardless of whether one particular tip is at the left or at the right when the propeller is horizontal, the right hand side distance will always measure the same, and the left hand side distance will also measure the same. If the right hand distance A1 and distance A2 EACH measure the same but are not equal to each other regardless of how the propeller is turned, the propeller is perpendicular to the shaft. If under these turning conditions, A1 and A2 are *unequal* in length, the shaft or motor is turned slightly and should be readjusted so that A1 and A2 are equal. First, you have to face the problem of adjusting the propeller perpendicular to the shaft and second adjusting the center line of the shaft parallel with the airplane's longitudinal axis. In the first case any one measurement, A1 or A2, should be the same regardless of how the propeller turns and in the second, A1 and A2 should be equal regardless of how the propeller is turned.

Next month we will have some interesting points of design to bring out concerning canard airplanes: for example, how large the front plane should be, where the C.G. should be, and why. One of the greatest problems of this type at present is the proper placement of the engine. The best position from a balance standpoint is directly at the center of gravity. Usually this requires an extension shaft rearward if the propeller is to be mounted far from the motor at the rear of the fuselage. Perhaps some of our enterprising motor manufacturers will burn a little midnight oil and design an extension shaft for their motors and make it available to ingenious model builders.

Don't forget to send in the designs of your brain children and questions for answering. We will discuss as many as space allows.

COMING CONTESTS

August 14, CALIF.—Milpitas, *San Francisco Vultures* Free Flight Gas Meet, Warm Springs Airport.

August 14, MONT.—Boulder, 1949 Model Airplane Controline Flying Circus, Class AA, sponsored by Boulder Athletic Club.

August 14, ILL.—Chicago, Class AA meet with U, Goodyear race events.

August 14, PA.—Burgettstown, Hillman's Model Airport, Duration and Precision flying.

August 21, N. Y.—Brooklyn, 6th Annual Free Flight Contest at Valley Stream, Long Island, (Old Curtiss Air Field), sponsored by *Brooklyn Sky-Scrapers.*

August 22-29, MICH.—Detroit, Plymouth International Meet.

August 28, PA.—Burgettstown, Hillman's Model Airport, Type D.

September 3, 4, 5, UTAH—Salt Lake City, 11th Annual Douglas Trophy Contest, AMA sanctioned.

September 4, FLA.—Jacksonville, 13th Annual Dixie State Contest, controline division.

September 4, PA.—Burgettstown, Hillman's Model Airport, Type M for 1st 2 hr.; Type E rest of time.

September 11, PA.—Burgettstown, Hillman's Model Airport, Team Competition.

September 18, PA.—Burgettstown, Hillman's Model Airport, RC.

September 18, ILL.—Chanute Field, Air Force Base Contest, AMA sanctioned, U.

September 18, PA—Burgettstown, Hillman's Model Airport, U Championship.

October 15-16, NEVADA—Las Vegas, Annual Western States U-control Contest, by *Nevada Aveites,* AMA sanctioned.

U—Controline; F—Free Flight Gas; R—Free Flight rubber; G—Glider; RC—Radio Control; W—Water Events (ROW); S—Scale; I—Indoor.

Airways

(*Continued from page 50*)

the Hawaiian Islands, participated in the event. This contest was one of many being held in the United States and its territories under an intensified American Legion model airplane program.

Canada

Bernard R. Marsh, of the *Canadian Gas Model Club*, sent in the results of the 1949 Canadian Wakefield Eliminations trials, which were held at the DeHaviland Airport. The six men who won the contest will make up the official Canadian Wakefield Team and will either represent their country personally in the Finals in England, or their models will be shipped across to be flown proxy. There were 35 contestants. The winners were: W. M. McKay—406.7 sec.; Ben Webb—377.6; John Korta—344; Allan Ford—320; Frank Loates—309; and Joe Wright—303.5.

South Africa

We recently received a copy of the South African *Aeromodellers'* Newsletter, THE FLYPAPER. R. G. Moulton wrote an article, "Aero-Modelling in England, particularly London, Spring '49," which we found interesting. Quote from his article: "But Radio Control is catching on—several really successful jobs are flying in the London area and judging by the number of commercial sets sold, there must be a terrific following in country districts. When one has seen a radio job do its stuff, ordinary free flight gets to be very tame, indeed."

Flash

(*Continued from page 5*)

IT USED TO be "high-octane" fuel that was so badly needed during the war but now its "low octane" that is in great demand. After working for 20 years to produce heavily-leaded fuels for aircraft engines, the gasoline producers are now being told to "get the lead out of your gas" since postwar tests have indicated that lower power is being used for long cruising flights resulting in heavy gum and tar deposits on cylinder walls and spark plug fouling. The high power used in combat airplanes burned up these residual products but Pratt & Whitney has recently lowered the octane rating of its huge R-4360 *Wasp Major* from 115/145 to 108/135 octane, which is a reduction from 4.6 cc of tetraethyl lead to only 3 cc. While this causes a slight lowering of maximum power, the increasing use of water-injection more than makes up for the difference.

AND NOW it's lightplane airlines! Yes, believe it or not, at least two airlines—Central Airlines, Oklahoma City; and Iowa Airplane Company, DesMoines,—are planning to start service on their routes using Ryan Navion and Beech Bonanza "airliners." The Civil Aeronautics Board has approved the idea—*within limitations*. CAB, which has approved these "feeder" routes, says it's okay to use single-engine aircraft provided they are used only in "contact" weather and over terrain "whose topography is favorable." The reason behind this permission is the fact that these two feeder airlines could not have operated Douglas DC-3 transports into some of the small airports on their routes but the four-place personal planes are ideal for the job.

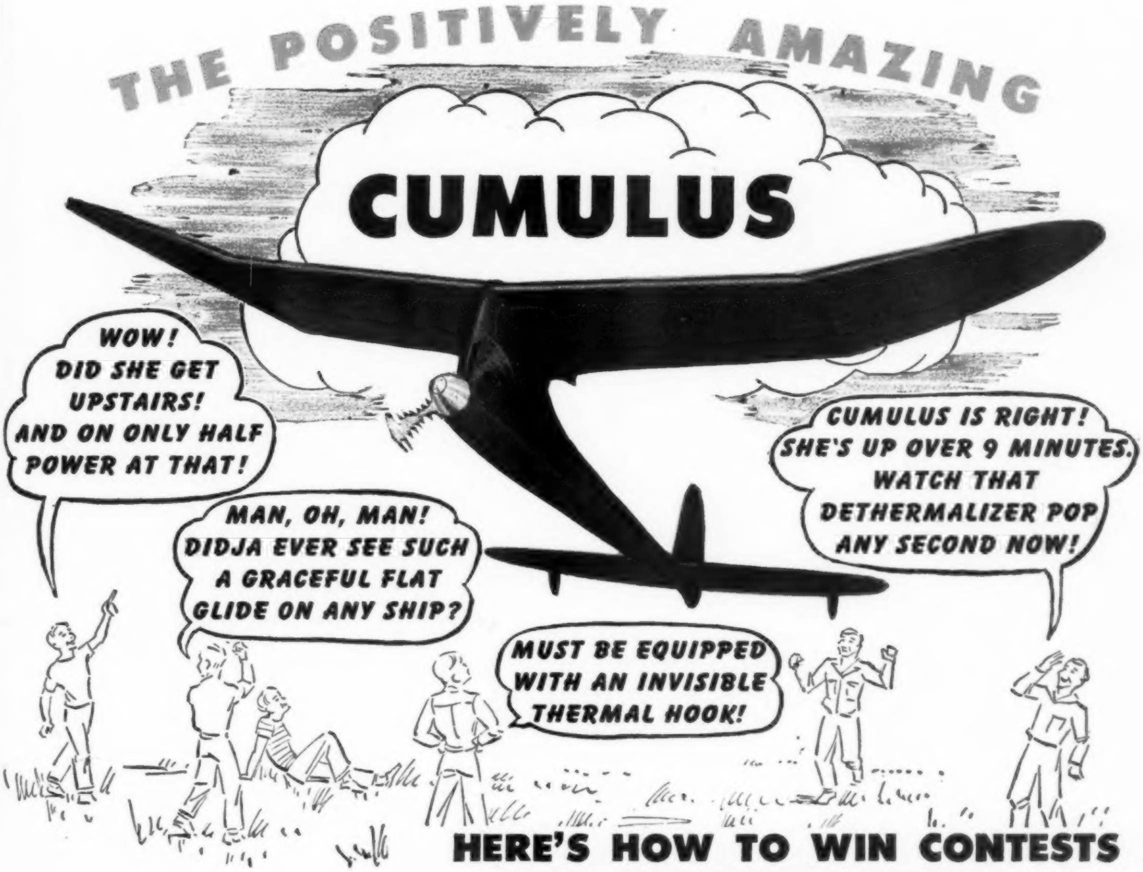
IT'S STILL a little shattering to learn that today, more than four years after V-E Day we still haven't a rocket missile even approaching the dread Nazi V-2 in size, speed or power! It's true that some of our research missiles are more efficient and better controlled, but they are still no match in brute strength to the monster German V-weapon. Latest of U.S. missiles, and the one most closely approaching the V-2 is the Navy-Martin *Viking*, but its speed of 2250 mph is no match for the 3500 mph of the V-2; its 51-1/2-mile altitude only half that of the V-2 and its thrust of 20,000 lb. for one minute hardly a candle to the 65,000 lb. thrust of the Nazi missile. Your "*Flash*" reporter has inspected dozens of wind tunnels in various research laboratories in the past two years and *most* of them were running tests on V-2 missile models, many the winged version designed for greater range. And V-2's are still being fired at White Sands Proving Ground, New Mexico in order to study their performance. We knew the Nazis were ahead of us in rocket-missiles but we sure didn't know they were *that* far ahead!

THE HUGHES Flying Boat—remember!—is still afloat and Howard Hughes insists it will fly again—soon. But when that "soon" is he refuses to say. The giant craft, largest airplane of any kind ever built, has been undergoing modification ever since its surprise test flight November 2, 1947. Hughes states that certain internal damage has been traced to sabotage, since many broken ribs discovered recently were intact following the first flight. Chief work over the past 18 months has been replacement of control surfaces and redesign of the control system. Eight new propellers will be installed to provide more thrust for the monster flying boat.

MANY OF our readers are old hands at Air Force and Naval Aviation airplane designations and have followed all of the various reassignments and modifications numbers and letters with great interest. But here is one for the books—it may require a little explanation. Air Force originally contracted with Convair for an XF-92 fighter to feature the now-familiar "delta-wing" layout. Halfway through the project, the engineers got a little worried about handling characteristics and decided to build a flying mockup before completing the prototype. This mockup was known as the "Convair Model 7002" and, as such, has

(*Turn to page 54*)

THE POSITIVELY AMAZING CUMULUS



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Fellas TAKE MY WORD FOR THIS!

Many of the old timers remember 10 years ago when I designed the now famous Zipper which startled the gas model world with its revolutionary flying. . . . Now here is my CUMULUS . . . a really modern free-flight that takes advantage of all the advancements in streamlining . . . wing and fuselage design . . . engine performance, etc., which have taken place during the last ten years. Yes, The CUMULUS will give you thrills today like the old timers got from my designs a decade ago. . . . Get one and start collecting trophies for yourself!

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Here is the CUMULUS! A slender beauty that typifies truly modern free-flight design. The CUMULUS embodies all the advancements which have accumulated during the last ten years. . . . All the improvements in streamlining, wing design, and engine power to give you thrilling performance with stability! Analyze these new features point for point with us and you'll see what we mean; for instance:

WING DESIGN: CUMULUS wing has straight taper with elliptical tip, high performance wing section with leading edge sheeted for greater efficiency and strength. Wing positively keyed in position, assures perfect alignment on every flight. Detaches on heavy impact . . . saves damage. Delivers a jet-like climb, yet glides as flat as a sailplane!

FUSELAGE DESIGN: Last word in streamlining and cowling. Fully sheeted for strength and rigidity. Proper duct cooling for engine efficiency. Complete power unit instantly detachable. Simplified single wheel take-off gear, retracts instantly when air-borne; no drag in flight.

TAIL DESIGN: New spar construction for greater rigidity to eliminate warping. Positive keying for perfect alignment. Detaches on heavy impact. Dethermalizer releases trailing edge and CUMULUS "mushes" in lightly.

DETHERMALIZER: New, simplified, tested, and foolproof. Works like magic to bring your CUMULUS down when you want.

SPECIFICATIONS: Span 54" Length 35" Weight (less engine) 16 oz. Wing area 3 sq. ft. for engines .19 to .36.

Besides all of these performance features, the CUMULUS kit is complete with typical American Hobby high quality material and those well-known "Easy to follow" full size plans, with plenty of step by step pictures and instructions.

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been test flown successfully at Muroc Air Force Base, Calif. Shortly before this mock-up was completed, Air Force cancelled the XF-92 project but decided to go ahead with the flying mockup test flight program. This was all well and good, but now the Air Force has thoroughly double-crossed designation students by changing its mind and designating the flying mockup the XF-92A! Thus, for your record-books (and peace-of-mind) there was *no* XF-92 but there *is* an XF-92A and the two are entirely *different* airplanes!

FIRST production model of the Fairchild C-119 *Packet* has passed test flights and been delivered to the Air Force. The new plane is the standard C-82 *Packet* but is powered by two Pratt & Whitney *Wasp Major* engines and relocates the pilot in the nose instead of atop the fuselage. U.S. Marine Corps will get eight of the new cargo planes designated R4Q-1.

THE LONG-awaited "Flying Crane" will soon be a reality, according to Hughes Aircraft Company, Culver City, Calif. The craft is, as its name implies, simply a jet-driven helicopter rotor with heavy hoists and hooks suspended below for attachment to cargo containers, tanks, trucks, etc. The project, the XH-17, originally started out as a Kellett design with the jet-rotors being developed by General Electric in their special testing pit. The rotor is 136′ in diameter and is powered by two G.E. J-35 turbojet engines, the hot exhaust from which exits out along the blades and through jet nozzles at the tips. The design will carry a load of 25,000 lb. over a distance of 65 miles. When the Kellett company got into financial difficulty, Hughes purchased the project.

IT WILL probably come as no news to regular readers that the Air Force is readying an order for about 100 Boeing B-47 six-jet bombers. That this is hardly news is due to the fact that with an order for only 10 airplanes, Boeing reopened its huge Wichita plant, began hiring thousands of workers, laying out extensive production lines and lining up hundreds of subcontractors—a pretty extensive preparation for only 10 airplanes! Now, however, it is obvious what the Air Force had in mind all along: designation of the swept-wing, super-fast (650 mph) bomber as our standard tactical, medium-range type. Production version will use General Electric J-47 turbojet engines, giving the sleek craft a power output of 48,000 hp at 375 mph with its 18 JATO rockets firing, the greatest power in any machine yet flown!

MOST OF us are pretty used to the steady climb in weight of aircraft but news that the new Lockheed XF-90 *single-seat* jet fighter weighs the same as a fully-loaded Douglas DC-3 transport is a hard jolt. Built for sonic speed, the needle-nosed XF-90 bears a family resemblance to the F-80 but inside its fuselage it mounts two Westinghouse 24-C turbojet engines with a total output of 6000 lb. thrust. The new fighter features swept-back wing and tail and auxiliary rocket motors for extra-thrust for take-off, acceleration through Mach one, or high-speed flight. Tony LeVier, who flew the huge fighter on its first flight, claims that the performance of the airplane on its 37-min. first test flight at Muroc Air Force Base, Calif., was within one mph of the design estimates (although top speed, of course, was not attempted).

MAYBE THE old saw about "good airplanes never die" is more truth than poetry for Trans-World Airlines recently discovered that there are at least 30 Ford Trimotor transports still in flying condition and licensed by the CAA. TWA's search was for a good, flyable Ford to be used in transcontinental celebration flights in connection with its 20th anniversary. But, maybe the old saw doesn't always apply for news comes that the Douglas XB-19, once the world's biggest airplane and billed as the "hemisphere defender" shortly before Pearl Harbor, has been broken up for scrap at Davis-Monthan Air Force Base. The "huge" bomber made its first flight in June, 1941, and saw plenty of flight test service as a flying proving ground for strategic bomber design and operational problems.

THE MARTIN XB-51 medium-bomber may be one of the most unusual designs yet to fly for in addition to its three turbo-jet engines (two in wing, one in fuselage); it will feature a variable-incidence wing, an idea 30 years old but one never successfully tested in a large aircraft.

PT-17 Kaydet

(*Continued from page* 17)

ASSEMBLY. As in the case of all biplane models, care must be taken when assembling so that everything will line up properly. By following the three view drawing, it shouldn't be too much of a job to locate the various parts in the proper position.

Probably the toughest part of the assembly, is fastening the wings to the fuselage and to one another without misalignment. On the original model, the upper wing was assembled to the fuselage first, by using the struts M and N and cementing them to the proper location on the wing center section. When the cement is partially dry, cement the other ends of these struts to the fuselage. After this, cement struts O, P, and Q to upper wing at the proper location. Now fit the lower wing panels to the fuselage and cement to struts O, P, and Q, then to the fuselage.

The rigging was done with a needle and button thread, after all cement joints had set. A round toothpick, which was sanded

to shape and size, was used for the rigging spacer bar between lower and upper wings.

Add the rudder, stabilizer, motor, landing gear, tail wheel, windshield, control outlines, insignia and any other details desired, and the model is almost ready for flight.

FLYING. To fly with rubber power it will be necessary to use four strands of 1/30" x 3/32" x 8-1/2" long. Fasten the rubber between the rear hook and the prop shaft hook; then try for a flat glide. It may be necessary to add a little modeling clay to the nose to get a flat glide. After a satisfactory glide, try short power flights and make proper adjustments. On the original model slight right thrust and slight down thrust together with a little right rudder was found satisfactory.

When using the *Campus* engine, the original model required no weight at the front end other than that of the engine itself. The *Campus A-100* used was of the original type which has the tank attached to the rear of the engine. To fill the engine tank, it was only necessary to pull the whole engine part way out of the dummy engine crankcase and to push the *A-100* back in place after filling the tank. However, should a new type *Campus* or similar engine be used, where the tank is separate, provision will have to be made to fill the tank through the bottom of the fuselage. Arrangement for the separate tank type of engine should prove no problem to the owners, as long as the tank is kept as far forward as possible to maintain proper balance.

Just as in the case of the rubber power, it will be necessary to use slight right thrust and slight down thrust together with a little right rudder. The adjustments can be best determined by flying under low power and observing the flight pattern. However the above data will serve as a general guide to builders of the PT-17.

Supermarine S-4

(*Continued from page* 25)

bushings in left wing tip. Add the 1/32" steel wire leads. Cover wing with 1/32" sheet balsa. Install wing on top of motor mount with zero degree incidence. Attach push rod to bellcrank and use 4-40 stop-nut to hold in place.

Notch fuselage top to fit wing and cement in place. Carve the side cylinder banks and cement in place. A small plywood tailskid may be installed for ROG purposes.

Attach balsa fairings to landing gear struts with cement and wrap with silk. The shim brass fillets are attached last. They are not cemented to fuselage, so gear can flex slightly on rough landings.

Make the floats in two pieces so they can be split apart and hollowed out for more buoyancy. Add metal bushings for the struts. Sand all wood parts with No. 2 sandpaper and then with wet-or-dry No. 400. Apply two coats of clear dope and spray gray primer on plane. Original plane was painted white. Use white dope if it is to be brushed or white lacquer if it is to be sprayed on.

The windshield, cowl and spinner are put on after painting. Wheels or floats can be attached with wheel collars or soldered washers.

Be sure to offset rudder 3/8" to right side before flying. Use 52' lines for flying. It is best to fly plane as a landplane first, to get accustomed to its characteristics before you attempt water operations.


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